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Work Related Needs, Preferences and Values: An Empirical Integration

by

(C) Donald Macnab

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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External Examiner

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To

my Mother and Father

Abstract

There have been comparatively few attempts on either an empirical or conceptual level to integrate the constructs of needs, values, and preferences. A rationale outlining how these concepts can be related to one another is presented. In addition,a rationale for examining the concurrent validity of instruments measuring the constructs of needs, values, and preferences is outlined with specific emphasis on occupational choice.

Three studies were carried out to attempt to integrate the concepts of needs, values, and preferences. The sample for the studies consisted of post-secondary students. Study 1 and study 2 had a sample of 438 students,(342 females and 96 males). The third study used a sub-sample of 317 from the total sample. The students completed a package of materials that included the Minnesota Importance Questionnaire (Gay, Weiss, Hendel, Dawis, and Lofquist, 1971) which measures vocationally relevant needs; the Work Values Inventory (Super, 1970) and the the Life Roles Inventory - Value Scales (Work Importance Study,1983), which measure work related values; and the Work Aspects Preference Scale (Pryor, 1978) which measures preferences individuals have for aspects of work.

Study 1 examined the relationship among eight traits that had common labels or operational definitions across all four instruments in a multitrait-multimethod design. The Campbell and Fiske (1959) MTMM criteria and confirmatory

factor analysis (using LISREL VI, Joreskog and Sorbom, 1984) demonstrated substantial convergent and discriminant validity. A series of models was tested with confirmatory factor analysis and overall the findings suggested that the traits were more important than the methods for explaining the variance in the MTMM matrix. It was concluded that the four instruments are measuring highly similar constructs.

The second study looked at the similarity of the structure of the four scales. A principal components analysis with varimax rotation was carried out on each instrument. Each analysis resulted in factors that were interpretable in light of previous research. The factor scores were calculated and the sets of factors were compared, in a pairwise fashion, using canonical correlation. The results indicated that all of the sets of factors are highly related to each other. The nature of these relationships and the common factors across the scales was discussed.

The third study examined the ability of the instruments to discriminate between groups of students who differ in their course of study. This study used a sub-sample of the students used in the first two studies. This sub-sample consisted of 105 business students, 129 education students, and 83 rehabilitation medicine students. All of the sub-sample were female. Sixty percent of this sample was used in the discriminant analyses of each instrument. The remaining fourty percent were used for validation purposes.

Each instrument, when applied to the cross-validation holdout sample, demonstrated an acceptable level of concurrent validity in its capacity to correctly classify post-secondary students into different groups.

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I. Introduction

Since the 1950's motivational concepts such as work values, needs, and preferences, have assumed an important role in both the theory and the practice of vocational guidance and organizational psychology. This family of constructs has been elaborated by psychologists to account for that portion of performance and occupational decision making that cannot be explained by ability and aptitude variables.

Although the literature is replete with studies of values, needs, and preferences as general human properties, there have been few attempts to relate or compare these concepts. In 1970, Zytowski pointed out that theorists in the area seldom, if ever, refer to each other's work. There has been little change in this regard in the last decade: theorists still make little reference to competing theories and, at an empirical level, there have been few studies that attempt to look at the relationships between constructs from different theoretical systems (Pryor, 1982). Although a large number of investigations has been carried out in this area, investigators have not, in general, learned from their endeavours as much as they might. There has often been insufficient attention paid to issues of conceptualization and measurement, so that the cumulative development of the field has been retarded. Specifically, several scales with the same construct names may, in practice, differ significantly at an operational level. Conversely, measures

intended to tap different constructs and having different titles and scales are often very similar to each other. With few exceptions (e.g. Pryor, 1982), researchers in this area have been reluctant to attempt enquiries into the boundaries and meanings of their constructs, resulting in problems of conceptual opaqueness and overlap. Thus, there is room for development at both a conceptual and empirical level. The present study will not offer a new set of terms for needs, preferences, or values but will, instead, endeavour to present an operational and empirical integration of these terms.

This integration will take the form of a set of empirical studies of constructs important in this area. Several instruments have been developed to measure values, needs, and related constructs. These instruments vary from scales concerned with the measurement of the value an individual places on such factors as personal development and self-actualization and which give scores on one broad construct (e.g. Warr, Cook and Wall, 1979); to measures based on wide-ranging scales offering indices of numerous different values, needs, and preferences (e.g. Super, 1968). The emphasis of the present study is on instruments which are in the latter category.

The instruments which are of specific interest include:

1. **The Minnesota Importance Questionnaire** (Gay, Weiss, Hendel, Dawis and Lofquist, 1971), which is designed to measure 20 vocationally relevant needs;

2. **The Work Aspect Preference Scale** (Pryor, 1978), designed to assess preferences which individuals have for 13 aspects of their work;
3. **The Work Values Inventory** (Super, 1970), which is constructed to assess 15 values which affect motivation to work;
4. **The Life Roles Inventory - Values Scale** (Work Importance Study, 1983), constructed to measure 20 values important to work and to life in general.

These instruments were selected for a number of reasons. Firstly, they and their related constructs typify some of the problems associated with this area. Each of the instruments purports to measure some aspect of work motivation. The Minnesota Importance Questionnaire and the Work Values Inventory have both been widely researched over the last decade and both are widely used. However, no studies have been reported which compare or contrast them. Thus, there exist two largely unrelated bodies of knowledge which relate to the same area of occupational and vocational psychology. The Work Aspects Preference Scale is included in the present study as it, too, relates to the same domain. It introduces yet another construct, preferences, into this already confusing situation. As the number of publications and the usage of this test grows, it is certainly useful to obtain information as to its relationship to the two well established instruments. Similarly, the Life Roles Inventory is a relatively new instrument and it is meant to be a

replacement for the Work Values Inventory. In addition, the instrument is a product of international and national research and has been normed on a Canadian national sample (Fitzsimmons, Macnab, and Casserly, 1984). As such it is likely that it will be widely used both in Canada and abroad. Thus, it is important that as much information as possible be gathered on this instrument.

The presentation of the research is structured in the following manner: Chapter II comprises a literature review which looks at the constructs of needs, values, and preferences as measured by the four instruments listed above. It looks at two levels of generality of the constructs, relates them to other studies, and establishes a rationale for the ensuing empirical research.

Chapter III briefly outlines the methodological approach and the sample used for the studies. In order to achieve an integration of the constructs three separate analyses were conducted, the first one focuses on the relationship between values, needs, and preferences at a scale level, the second one examines the structure of the four instruments as well as the relationship between these structures, and the third one tests the concurrent validity of the four instruments. These three studies are outlined separately in Chapter IV. Each problem is briefly described, a solution to the problem is proposed, the results are presented and discussed. Chapter V provides an integrated discussion of the result of all three studies.

II. Literature Review

The literature review consists of three sections and attempts to look at the constructs of needs, preferences, and values as measured by the Minnesota Importance Questionnaire, the Work Aspects Preference Scale, the Work Values Inventory, and the Life Roles Inventory-Value Scales. These constructs will be defined in their theoretical contexts with emphasis being placed on their operationalizations, reliability, and validity. In doing so an attempt will be made to show that the instruments measure concepts that are highly similar with the main difference between them being in their theoretical position and not in their operationalizations. This section will concentrate on the lowest levels of construct generality, item definition and scale definition.

An ongoing concern in the area of work motivation concerns the structure or content of the domain. Thus, the second section of the literature review will deal with the next level of generality - that of the dimensionality or structure of work related needs, preferences, and values with specific attention to the Minnesota Importance Questionnaire, the Work Aspect Preference Scale, the Work Values Inventory, and the Life Roles Inventory-Value Scale.

The third section will review a number of studies related to needs, preferences, and values and occupational choice. The review will survey the literature concerned with the differences amongst people aspiring to different

occupational groups with specific emphasis on college level students. In doing so a rationale for examining the concurrent validity of the Minnesota Importance Questionnaire, the Work Aspects Preference Scale, the Work Values Inventory, and the Life Roles Inventory-Value Scales will be established.

A. Constructs of needs, preferences, and values

The following section will look at the constructs of needs, preferences, and values as they are used in the present study. The constructs will be defined and the instruments attached to them described. An attempt will be made to compare and contrast them.

Needs

The concept of needs examined in the present study derives from the Theory of Work Adjustment (Dawis, England and Lofquist, 1964; Dawis, Lofquist and Weiss, 1968; Lofquist and Dawis, 1969; Dawis and Lofquist, 1984). The basic concepts of the Theory of Work Adjustment are the individual and the environment. Briefly, the theory states that work adjustment can be predicted from the match between the individual's personality and the work environment. The individual's work personality is defined by his abilities and his "needs". Lofquist and Dawis (1969) define needs as "preferences for reinforcers expressed in terms of the relative importance of each reinforcer to the individual."

The significant aspects of the work environment are the ability requirements and the reinforcers available in jobs. Reinforcers are defined as "stimulus conditions that follow upon and are associated with the maintenance of responding, that is, work behaviour." (Lofquist and Dawis, 1969)

Job satisfaction is then predicted from the degree of match between the individual's needs and the available reinforcers.

In their later work Lofquist and Dawis (1978,1984) have developed the idea that values are the basic reference dimensions underlying needs. Using factor analysis they identify 6 underlying values: Safety, Autonomy, Achievement, Altruism, Self Aggrandizement, and Comfort.

The Minnesota Importance Questionnaire(MIQ)

The MIQ was developed to assess individual needs that are relevant to work adjustment. The needs are: Ability Utilization, Achievement, Activity, Advancement, Authority, Company Policies and Practices, Compensation, Co-Workers, Creativity, Independence, Moral Values, Recognition, Responsibility, Security, Social Service, Social Status, Supervision-Human Relations, Supervision-Technical, Variety, and Working Conditions. These and their work related reinforcers are presented in Table 1.

In completing the instrument, an individual expresses the relative importance of the 20 needs. Two forms of the MIQ are available; a ranked form and a

Table 1: Description of the Subscales of the Minnesota Importance Questionnaire

Subscale title	Description
ABILITY UTILIZATION	-tasks that allow exercise of self-perceived skills and talents.
ACHIEVEMENT	-tasks that are productive of pride in the accomplishment thereof.
ACTIVITY	-tasks that call for a relatively constant and sustained level of energy investment.
ADVANCEMENT	-work environment in which there is an opportunity for fair evaluation of and consequent advancement
AUTHORITY	-tasks that include power to decide the methods by which a job is performed and to impose those decisions on co-workers.
COMPANY POLICIES AND PRACTICES	-work environment characterized by explicit and definitive guidlines consistently disseminated and practiced.
COMPENSATION	-tasks providing compensation based on quantity and quality of work performed
CO-WORKERS	-work environment in which employees are interested in and responsive to friendly interpersonal gestures and relationships.
CREATIVITY	-tasks that are amenable to innovations
INDEPENDENCE	-work environment in which the individual works alone.
MORAL VALUES	-tasks that do not conflict with a worker's unwilligness to participate in any action she or he defines as wrong doing.
RECOGNITION	-work environment in which rewards are forthcoming for individual performance
RESPONSIBILITY	-tasks that facilitate the exercise of autonomy and accountability.
SECURITY	-work environment that promises continuity of employment and compensation.
SOCIAL SERVICE	-tasks perceived to promote the welfare of others.
SOCIAL STATUS	-work environment that provides an opportunity for advancement
SUPERVISION HUMAN RELATIONS	-work environment in which the supervisor creates and maintains an atmosphere of mutual respect and personal investment among subordinates and superiors.
SUPERVISION TECHNICAL	-work environment characterized by competent and effective supervision.
VARIETY	-tasks characterized by a range of possible activities.
WORKING CONDITIONS	-work environment characterized by agreeable physical conditions.

paired-comparison form. The ranked form asks the respondent to rank order a set of five statements in terms of their importance in an ideal job. For example:
On my ideal job...

a. I could be busy all the time.

b. I could do things for other people.

c. I could try out some of my own ideas.

d. My pay would compare well with that of other workers.

e. The job would provide an opportunity for advancement

The paired comparison format consists of 190 paired items. This represents the pairing of all 20 statements. For example:
Ask yourself:
Which is more important to me in my ideal job ?

a. I could be busy all the time.

1. OR

b. The job would provide an opportunity for advancement.

Both forms include a section which presents the 20 statements representing the 20 values. The subject is asked to consider each of the 20 needs one at a time and indicate whether or not the item is important to have in an ideal job.

Hendel and Weiss(1970) report Hoyt reliability coefficients for nine different groups. The median

reliability coefficients ranged from .77 to .81. The lowest single scale reliability for any group was .30 and the highest .95.

Hendel and Weiss(1970) also report test-retest reliability coefficients for a number of time periods ranging from immediate retest to retest after 10 months. Median scale test-retest reliability coefficients range from .48(6 months) to .89 for immediate retesting.

Scale intercorrelations range from .05 to .77 with median intercorrelation of .33 (Gay, Weiss, Hendel, Dawis and Lofquist,1971).

Evidence of divergent validity is reported in Weiss, Dawis, Lofquist, and England(1966). They state that the relationship between the MIQ and the General Aptitude Test Battery(GATB) is uniformly low. Cross correlations between GATB and MIQ scales cluster around zero.

Gay, Weiss, Hendel, Dawis, and Lofquist(1971) report evidence of concurrent validity. They found scale differences between vocational rehabilitation counsellors, retail trade workers, vocational rehabilitation clients, high school counsellors, college students, and high school students.

Gay and Weiss(1970) examined the relationship between the MIQ scales and amount of work experience. They found that persons with different amounts of work experience tended to have different levels of MIQ scale

values.

Values

The concept of values is rooted in theories of vocational behaviour which stress the concept of self. Super(1957) defines the self as a developing set of perceptions of the person's characteristics. These are seen to be derived mainly from models which are tested through experience. If, as a result of this testing, the individual obtains gratification then these perceptions are consolidated; if no gratification is forthcoming then these perceptions eventually will be discarded. Work is an opportunity to implement and further develop one's concept of self. Within the concept of work the individual develops and implements a vocational self-concept. Fundamental to this is the attempt to fulfill one's work values.

Values in Super's theory consists of "objectives that one seeks to attain to satisfy a need . . . they are objectives sought in behaviour"(Super,1973). Super(1970,1973) considers values to be integral to the vocational development and adjustment of the individual and describes values as "qualities desired by people in their activities, life situations, and acquisitions"(1970). Super sees values as being derived from needs

> "the need to have, to do, even to be, leads to action, and action leads to modes of behaviour or traits that seek objectives formulated in generic

terms (values) or in specific terms (interests) . . . . . values are objectives that one seeks to attain to satisfy a need."(Super, 1973)

The Work Values Inventory(WVI)

The WVI was developed as a means of assessing values that affect the motivation to work. Research beginning in 1951 resulted in several preliminary instruments that preceded the current edition (Super, 1968). The current version measures 15 work relevant values: Altruism, Aesthetics, Creativity, Intellectual Stimulation, Achievement, Independence, Prestige, Management, Economic Returns, Security, Surroundings, Supervisory Relations, Associates, Way of Life, and Variety. The operational definitions of the values are found in Table 2.

The WVI is designed for use with all ages from the beginning of junior high school upwards, and is focused on

> "the values which are extrinsic to as well as those which are intrisic in work, the satisfactions which men and women seek in work and the satisfactions which may be concomitants or outcomes of work" (Super,1970)

The instrument consists of 45 items, three for each value. Respondents are asked to indicate how important each of these items is in their work. The response categories are: "Very Important", "Important",

Table 2: Definitions of the sub-scales of the Work Values Inventory

Subscale title		Description
ACHIEVEMENT	-	work which gives one the feeling of accomplishment in doing a job well.
AESTHETICS	-	work which permits one to make beautiful things and to contribute to the beauty of the world.
ALTRUISM	-	work which enables one to contribute to the welfare of others.
ASSOCIATES	-	work which brings one into contact with fellow workers whom one likes
CREATIVITY	-	work which permits one to invent new things, design new products, or develop new ideas.
ECONOMIC RETURNS	-	work that pays well and enables one to have the things one wants
INTELLECTUAL STIMULATION	-	work which provides opportunity for independent thinking and for learning why things work
INDEPENDENCE	-	work that permits one to work in one's own way, as fast or as slowly as one wishes.
MANAGEMENT	-	work which permits one to plan and lay out work for others to do.
PRESTIGE	-	work which gives one standing in the eyes of others and evokes respect.
SECURITY	-	work which provides one with the certainty of having a job even in hard times.
SUPERVISORY	-	work which is carried out under a supervisor who is fair and with whom one can get along.
SURROUNDINGS	-	work which is carried out under pleasant conditions.
VARIETY	-	work that provides an opportunity to do different types of jobs.
WAY OF LIFE	-	work that permits one to live the kind of life one chooses and to be the type of person one wishes.

"Moderately Important", "Of Little Importance", and "Unimportant". Examples of the items are:

Work in which you....

1....have to keep solving new problems.

2....help others.

Test-retest reliabilities (2 week interval) for a sample of 99 10th grade students are reported in the WVI manual (Super,1970). They range from .74 for the Associates scale to .88 for the Economic Returns scale, with a median of .83.

The subscales are generally positively intercorrelated. For 12th grade boys, sub-scale intercorrelations ranged from -0.07 to 0.66 with a median of 0.29. Factor analytic support for the 15 a priori scales is not offered in the manual.

Construct validity was assessed by relating the WVI to the Allport Vernon Study of Values, the Strong Vocational Interest Blank and the Kuder Preference Record. Evidence reported for construct validity includes correlations of individual values with individual scales of the other instruments. For example, the Altruism scale of the WVI correlates positively with the Social Service Scale of the Kuder (.67).

Greenhaus and Simon(1977) using a sample of 153 psychology students found that those who were vocationally undecided placed less importance on intrinsic work values than did those committed to an

occupation. Other studies, similarly based on student samples, are by Greenhaus and Simon(1976), Pryor(1980), Richardson(1974), and Dietrich(1977). Generally these give descriptive statistics and provide evidence relevant to construct validity.

Concurrent validity has been studied in relation to occupational differences (Normile, 1967). However, the evidence relates to an earlier version of the WVI.

Work Importance Study

A further influence of Super's thinking can be seen in the development of the International Work Importance Study (1979,1980, 1981,1982, 1983). The primary aim of the Work Importance Study was to produce an integrated series of measures for the assessment of various aspects of work values and work salience. A major objective was the development of instruments that were cross-culturally equivalent. The original emphasis rested on the meaning of work for the individual both in terms of the rewards sought from work and of the relative importance assigned to work as opposed to other activities. The rewards sought from work are conceptualized as "work values".

The emphasis of the Work Importance Study has shifted in recent years to rewards and satisfactions sought from life in general rather than from work alone.

Life Roles Inventory - Values Scale(LRI-VS)

As part of the Work Importance Study project the LRI-VS was developed. The LRI-VS has undergone a number of developmental steps. The initial step included national literature reviews as well as key-word searches (Kidd, Knassel, and Super,1979). On the basis of these reviews a list of 23 values was adopted. These were Ability Utilization, Advancement, Aesthetics, Associates and Social Interaction, Authority, Autonomy, Creativity, Economic Rewards, Economic Security, Environment, Intellectual Stimulation, Life Style, Participation in Organizational Decision Making, Prestige, Responsibility, Risk-Taking and Safety, Spiritual Values, Supervisory Relations, Variety, Cultural Identity, Physical Activity. The latter two were optional. Draft Specifications and sample items were developed and tested (WIS,1980). The products were two 21 value scales, each value measured by 5 items. The instruments were refined with a number of field trials in Australia, Canada, Portugal, Spain, U.S.A., and Yugoslavia (WIS, 1981). After these field trials the scales were revised on the basis of reliability data, inter-item correlations, scale inter-correlations and item-factor analysis. As a result 4 of the original scales were dropped: Intellectual Stimulation, Participation in Organizational Decision Making, Responsibility, and Spiritual Values; two scales were

combined (Economic Rewards and Economic Security) to make up an Economics scale; the Associates scale was split into two new scales (Social Interaction and Social Relations), the latter replacing the Supervisory Relations scale. The Environment Scale was focused on Working Conditions and renamed accordingly; a new scale (Personal Development) was included. Physical Activity and Physical Prowess were kept for cross-national comparisons. So, with the inclusion of Personal Development the 21 a priori scales became 18 plus 2 optional scales. The 20 scales (18 cross-national; 2 optional) are presented in Table 3.

The Life Role Inventory - Values Scale consists of 100 items. The respondents are asked to indicate how important an item is or will be for them. The 4 response alternatives are "little or no importance", "some importance", "important", and "very important". The items for the 20 values, each comprised of five items, are spaced 20 items apart. Some sample items are:

1. use all my skills and knowledge

62. achieve the goals I have set for myself

The LRI-VS was normed on a Canadian sample numbering over 10000 (Fitzsimmons, Macnab, and Casserly,1984a). Internal consistency coefficients were calculated for the sample and for subsamples. Fitzsimmons, Macnab, and Casserly (1984b) obtained internal consistency coefficients ranging from .68 for

Table 3: Definitions of the Sub-scales of the Life Roles Inventory - Values Scales

Subscale title		Definition
ABILITY UTILIZATION	-	to use one's skills and knowledge
ACHIEVEMENT	-	to have results which show one has done well
ADVANCEMENT	-	to get ahead
AESTHETICS	-	adding to and enjoying the beauty of processes, products and surroundings, both natural and man-made.
ALTRUISM	-	helping others and being concerned for their welfare
AUTHORITY	-	telling others what to do
AUTONOMY	-	to act on one's own
CREATIVITY	-	to be creative
ECONOMICS	-	to have a high standard of living
LIFE STYLE	-	to live according to one's own ideas
PERSONAL DEVELOPMENT	-	to develop as a person
PHYSICAL ACTIVITY	-	to exercise a lot
PRESTIGE	-	to be admired and recognized
RISK	-	to be able to take risks
SOCIAL INTERACTION	-	to do things with other people
SOCIAL RELATIONS	-	to be with friends
VARIETY	-	to have changing activities or conditions
WORKING CONDITIONS	-	to have a good work setting, good treatment, and associates
CULTURAL IDENTITY	-	to be accepted as a member of one's race, religion, or ethnic group
PHYSICAL PROWESS	-	to work hard and use one's strength

Achievement to .91 for Altruism with a median coefficient of .83 for a group of 623 students. Similar coefficients were found for a national sample responding to the English version of the LRI-VS. Test-retest coefficients were obtained on a group of high school students (n=986). These ranged from .61 (Personal Development) to .82 (Physical Activity and Physical Prowess) with a median test-retest coefficient of .70. Alternate form (English and French) reliability coefficients were calculated for 159 bilingual high school students; these ranged from .62 (Achievement) to .88 (Physical Prowess) with a median coefficient of .73.

Fitzsimmons, Macnab and Casserly(1984b) report the results of an item factor analysis of the English and of the French versions of the LRI-VS with the adult norming sample. The construct validity is partly supported by their findings. Fourteen of the 20 scales were well defined by the item factor analysis. The items from Achievement/Prestige loaded on the same factor; the items from Autonomy and Life Style loaded on the same factor; the items from Social Interaction and Social Relations loaded on the same factor for the English version of the scale. These findings were replicated for the French version. Shears(1982) studied the construct validity of the value scales. The Values scale and the Work Quiz (Taylor,1975) were administered to 700 Australian students. Correlations were computed between

each of the three Work Quiz scales (Responsibly Committed, Traditionally Comfortable, and Passively Unconcerned) and the LRI-VS. Most value scales correlated positively with the Traditionally Comfortable Scale; the highest correlations were with Economics and Prestige. Altruism had the lowest correlation with this scale. Creativity, Altruism, and Ability Utilization had significant negative correlations with the Passively Unconcerned scale. Aesthetics, Altruism, and Ability Utilization were positively correlated with the Responsibly Committed scale.

Preferences

The concept of preferences that is used in the present study derives from the work of Pryor(1979,1981a, 1981b). He suggests that the concept of work values is poorly formulated and confused and proposes the concept "work aspect preferences" in its place (Pryor, 1979). He defines a work aspect preference as "a statement of the relation between a person (the subject of the relation) and a particular quality of work (the object of the relation). The nature between the two is that of a greater or lesser liking when the person has the opportunity to make a choice."

He argues that psychology is a long way from agreeing upon the substantive nature of the person and that the best basis for differentiation of work aspect preferences is on the basis of the characteristics of work.

The Work Aspect Preference Scale(WAPS)

The WAPS was proposed by Pryor(1979) as a method of measuring people's preferences for different aspects of work. A taxonomy of work aspects was developed from already existing work values scales and from the literature relevant to them. A number of versions of the WAPS have been constructed. Pryor(1980) reports that principal components analysis was used at different points in the construction of the instrument, mainly to organize the item content and to check on scale homogeneity. The WAPS is designed to measure the preferences for 13 work aspects. These are listed in Table 4. Each of these 13 scales is represented by 4 items. The respondent is asked to rate the importance of different aspects of work on a five point scale: "quite unimportant", "of little importance", "fairly important", "quite important", and "extremely important". Examples of items are:

Work in which you.....

1.... improve the skills you have.

2.... are looked up to by other people in society.

Reliability data on the WAPS have not yet been published. No test-retest data are available at present.

Pryor(1981) presents evidence for the discriminant validity of the WAPS. He administered the WAPS and the Kuder Preference Record(KPR) to a sample of 107 high

Table 4: Definitions of the Sub-scales of the Work Aspect Preference Scale.

Subscale title		Description
SELF DEVELOPMENT	-	a concern for developing one's skills and abilities.
SECURITY	-	a concern for being able to maintain one's job.
INDEPENDENCE	-	a concern for being free from imposed constraints in the work environment.
CREATIVITY	-	a concern for developing something original through one's work.
ALTRUISM	-	a concern for assisting others.
MANAGEMENT	-	a concern for organizing the work of others.
MONEY	-	a concern for obtainig large financial rewards from one's work.
PRESTIGE	-	a concern for recognition and status in in the eyes of others.
CO-WORKERS	-	a concern for receiving friendship and understanding from those with whom one works.
PHYSICAL ACTIVITY	-	a concern for being physically active in one's life.
DETACHMENT	-	a concern for being able to separate work and its influence from other parts of one's life.
LIFE STYLE	-	a concern for the effect that employment may have on where and how one lives.
SURROUNDINGS	-	a concern for the kind of physical environment in which one works.

school students. There were very few significant correlations. The only correlations of importance were between the KPR-Social Service Scale and the WAPS Altruism scale(.48) and Money scale(-.38). The study shows that the KPR and the WAPS are measuring distinctly different domains.

Pryor(1981) also reports that the WAPS discriminates significantly between groups based upon expressed occupational choice categories. Understandable patterns of subscale scores were indicated for each choice category. For example, those expressing a preference for nursing had high scores on Altruism and Physical Activity, and low scores on Independence, Management, and Money.

Summary

The above outline of definitions of needs, values, and preferences and their measurement with the MIQ, WAPS, WVI, and the LRI-VS leads to the issue of the use of language describing motivational considerations in vocational behaviour. As we have seen, both the theory of Super(1973) and of Lofquist and Dawis(1968,1984) make use of the words values and needs in describing aspects of motivation. However, on close inspection, the level of generality of the constructs of needs and values in the two theories are very different. Both suggest a hierarchical relationship between needs and values. The terms are arranged in order of

remoteness from specific activities and objectives in "actual life". Needs, in Super's theory, are human characteristics which are argued to be capable of satisfaction in a number of ways. Values are argued to have a closer relationship with specific activities and objectives. Although Lofquist and Dawis use the same language and also perceive a hierarchical relationship between needs and values, they see needs as being molecular and specific in nature, with specific needs being attached to specific environmental reinforcers. Values,for them, are a grouping of needs in terms of their underlying communalities and are global in nature. Thus, needs and values in both theories are reversed in terms of their globality. Needs, in Lofquist and Dawis's(1968,1984) theory are equivalent to values in Super's(1973) theory in terms of their specificity.

The foregoing analysis suggests that the WVI and the LRI-VS scales which measure values as defined by Super, and the MIQ which measures needs as defined by Lofquist and Dawis, measure elements of work motivation at the same level of generality. Similarly, preferences, as defined by Pryor measure specific aspects of work and there are as many preferences as there are aspects to work.

A key element in the definitions of the three concepts is that the variables are restatements of social or work environments. The language of motivation may consist of person-related or situation related vocabulary; the concepts

of needs, values, and preferences use the latter.

A second similarity exists between the operationalization of these constructs. Each instrument consists of a list of needs, values, or preferences. Tables 1, 2, 3, and 4 list the variables and their definitions. A number of variable names are similar. Thus, in the WVI and the LRI-VS we have the value called Creativity; in the WAPS the preference, Creativity, and the MIQ the need, Creativity.

A third level of similarity exists which suggests that the three constructs might be highly related. A close analysis of the instruments that measure the concepts reveal similarities in terms of the task that respondents have to carry out. The instructions for the MIQ requests the subject to "draw a mental picture of his job" (Weiss, 1973) by asking the respondent to choose between pairs of statements and to "indicate his preference"(Weiss, 1973) for one of the pairs. Thus an individual is asked to make a choice about the importance of his "ideal job". In a similar vein the WAPS requires the respondent to rate the test items along an importance dimension; ranging from "Quite Unimportant" to "Extremely Important". Again the WVI and the LRI-VS ask the respondent to rate the items contained in the instruments in terms of their importance; the WVI asking the respondent to rate statements about "Work in which you. . . . " from "Unimportant" to "Very Important"; the LRI-VS asking the respondent to rate statements in terms of their importance

"now or in the" future of a scale from "little or no Importance" to "Very Important". Thus, all instruments are concerned with what individuals think is important about their work or their life.

The foregoing "content analysis" of the constructs of needs, values, and preferences suggests that we are dealing with a set of constructs that are highly similar; they deal with the same area of vocational behaviour, they operate at the same level of generality, they possess similarities in the way social and work environments have been used to generate traits, and they are all concerned with what individuals think is important about their work.

As theorists seldom refer to each other it is difficult to know what the relationships, if any, are between the theoretical constructs from these different systems. On an empirical level the research in this area can be characterized by sets of disparate results which apparently bear little relationship to one another.

One focus of the present study will be to explore the relationship between the different constructs from different theoretical systems with the goal of adding some clarity to an area that is terminologically and conceptually confused.

B. Structure of the MIQ, WVI, LRI-VS, and the WAPS

This section gives a brief overview of the empirical findings related to the structure of the MIQ, WVI, the LRI-VS, and the WAPS. A number of studies have examined the

structure of the MIQ; WAPS, WVI, and the LRI-VS, but few attempts have been made to compare the structures found in the various studies. The following is an outline of the research that has been conducted to date on the four instruments. Most of the research has been carried out using Super's Work Values Inventory, and fewer studies have been carried out using the Minnesota Importance Questionnaire, the Life Roles Inventory-Values Scales, and the Work Aspect Preference Scale. Most of the studies reviewed in the following section have utilized one form of factor analysis or another with the exception of Pryor, who uses hierarchical cluster analysis.

Minnesota Importance Questionnaire

Studies carried out with the Minnesota Importance Questionnaire have to date on the whole found that the factor structure of the needs assessed by the instrument can be organized around 6 dimensions. Four factor analyses of MIQ data, on four groups were reported by Lofquist and Dawis (1978). The groups consisted of 1621 vocational rehabilitation clients, 3033 employed workers, 419 college students, and a heterogenous group of 5358 individuals which included the above 3 groups plus 285 vocational-technical school students. A principal factor solution was used with squared multiple correlations in the diagonal, with varimax rotation. The authors report that similar results were obtained for each group. The six factors and the needs with

the highest loadings are as follows: Factor I appears to represent the importance of SAFETY in a predictable work environment and loads highest on the following scales: Company Policies and Practices, Compensation, Security, Supervision - Human Relations, Supervision - Technical scales. Factor II reflects the importance of AUTONOMY loading highest on Authority, Creativity, and Responsibility scales. Factor III appears to describe a preference for COMFORT in the work environment with highest loadings on Activity, Independence, Security, Variety, and Working Conditions scales. Factor IV reflects the importance of ALTRUISM and loads highest on Co-workers, Moral Values, and Social Service scales. Factor V indicates preferences for an environment that permits ACHIEVEMENT and loads highest on Ability Utilisation, Achievement, and Advancement. Factor VI appears to describe the importance of opportunities for SELF AGGRANDIZMENT and loads highest on Authority, Recognition, and Social Status scales.

Two additional analyses show similar results. The authors argue that the six dimensions can be categorized into the following classes: a) preferences related to the external environment:safety and comfort values; b) preferences related to reinforcements provided by other people: aggrandizement and altruism; c) preferences related to intrinsic or self reinforcement: achievement and autonomy. They go on to argue that these classes can be further subdivided in terms of how an individual may view

work in terms of competitive and non-competitive approaches.

Competitive values	Non-Competitive Values
Safety	Comfort
Aggrandizement	Altruism
Achievement	Autonomy

The Work Values Inventory

The Work Values Inventory (Super, 1957, 1970) has been subjected to factor analyses a number of times at both item and scale level.

O'Connor and Kinnane (1961) used a 30 item version of the Work Values Inventory (2 items for each value) with 191 undergraduate men. They carried out a factor analysis on the thirty items. Six factors were extracted using a complete centroid method. The centroid solution was obliquely rotated until a satisfactory simple structure solution was achieved. The following factors appeared identifiable:
Factor 1 which they named a SECURITY-ECONOMIC MATERIAL FACTOR which loaded highest on items in which work is valued for good pay, job security, sufficient monetary rewards, and fair supervision. Factor 2 was named a SOCIAL-ARTISTIC FACTOR which was best described by Altruism and Aesthetic items. Factor 3 was a WORK CONDITIONS AND ASSOCIATES FACTOR which was best described by items from the Surroundings and the Associates subscale. Factor 4 was designated a HEURISTIC-CREATIVE FACTOR loading highest on Creativity items. Factor 5 was called an ACHIEVEMENT-PRESTIGE FACTOR

and was described by items from the Prestige, Mastery, and Independence scales. Factor 6 was termed an INDEPENDENCE-VARIETY FACTOR loading on items from the Variety and Independence scales.

Using the present form of the Work Values Inventory, Hendrix and Super (1968) carried out a study with 51 10th grade males and 48 10th grade females who were administered the Work Values Inventory on two occasions two weeks apart. The 4 sets of data were analyzed using a principal components analysis with varimax rotation. They assumed four or five basic dimensions underlying the 15 scales. For males four reasonably stable dimensions were found at both test and retest: Factor 1 for males was named a MATERIAL or SITUATIONAL factor loading highest on Security, Economic Returns, Supervisory Relations, Surroundings, and Way of Life; Factor 2 included a combination of Altruism, Associates, and Surroundings. They named this factor GOODNESS OF LIFE; Factor 3 was named SELF-EXPRESSION and is identified by high loadings on Creativity, Variety, and Intellectual Stimulation; Factor 4 was defined as a combination of Independence and Management and was named a BEHAVIOUR CONTROL FACTOR.

The first factor for the females appears to be identical to the male Factor 1; Factor 2 was again related to Factor 2 for the males with the common value being Altruism; Factor 3 appeared to be defined by Aesthetics, Creativity, Independence, and Variety and was closely

related to the male Factor 3; Factor 4 for the female sample showed no stable characteristics across the two testing periods.

Gable and Pruzek(1971) conducted a number of multivariate studies with the Work Values Inventory. Using the data from 200 10th grade students they carried out an image analysis on the items of the WVI and decided that a 13 factor rotation provided the most interpretable solution. 10 of these factors were selected as being interpretable. These generally can be ordered according to Super's(1968) value terms: Security-Economic; Supervisory Relations; Altruism; Achievement; Aesthetic-Creative; Intellectual Stimulation; Management-Prestige; Variety; Independence; Way of Life. They relate these to the factors found by Hendrix and Super(1968) but did not, however, carry out any second order factor analysis on the data.

Bolton(1980) administered the WVI to a group of 445 physically disabled clients. The 45 items were condensed via principal components analysis and 6 factors were extracted and rotated by a varimax procedure.

Factor 1 was formed from items from the Intellectual Stimulation, Variety, and Creativity scales and was termed a STIMULATING WORK FACTOR; Factor 2 was called an INTERPERSONAL SATISFACTION FACTOR and was made up of items from the Altruism, Associates, and Achievement scales; Factor 3 consisted of items from the Economic Returns and Security scales and was named ECONOMIC SECURITY; Factor 4

had highest loadings on items from the Management and Independence scales and was termed RESPONSIBLE AUTONOMY; Factor 5, called the COMFORTABLE EXISTENCE FACTOR, loaded highest on items from the Surroundings and Way of Life scales; Factor 6 was an AESTHETICS FACTOR loading on items from the Aesthetics scale.

Pryor(1980) administered the Work Values List, containing 13 values derived from the work of Super (1962,1970), to 165 Australian students. Four factors were extracted: Factor 1 loaded on Surroundings, Economic Returns, Security, Associates, Prestige, and Supervisory Relations and was named an EXTRINSIC CONCERN FACTOR; Factor 2 was labelled an INTELLECTUAL CONCERN FACTOR and the highest loadings occured on Intellectual Stimulation, Creativity Management, and Achievement; Factor 3 loaded on Variety, Independence, and Supervisory Relations and was labelled a FREEDOM CONCERN FACTOR; Factor 4 was dominated by high loadings on Altruism and moderate negative loadings on Independence and Economic Returns and was called a PEOPLE CONCERN FACTOR.

Two and a half years later the test was administered to the same group of subjects and two factors remained substantially the same (INTELLECTUAL CONCERN and PEOPLE CONCERN FACTORS). The EXTRINSIC CONCERN FACTOR became differentiated into what Pryor(1980) calls STATUS/POWER CONCERN and a CO-WORKER CONCERN FACTORS. The STATUS/POWER CONCERN FACTOR had high negative loadings on Prestige,

Surroundings, and Management, while the CO-WORKER CONCERN FACTOR loaded highly on Associates, Supervisory Relations, and Economic Returns, with lower loadings on Independence and Variety.

Hesketh's(1982) study using a sample of 229 5th, 6th, and 7th formers in New Zealand, indicates support for the first factor found by Super(1968). A principal components analysis with varimax rotation was performed on the 15 scales and four factors were extracted: Factor 1 consists of Supervisory Relations, Surroundings, Economic Returns, Security, and Associates. Hesketh terms this an EXTRINSIC CONCERN factor; Factor 2 involves what Hesketh terms a POWER/STATUS DIMENSION, with high loadings for Prestige, Management and Aesthetics; Factor 3 is called a INTELLECTUAL CONCERN FACTOR loading on Intellectual Stimulation, Achievement and Creativity; Factor 4 has high loadings on Variety, Independence, and Way of Life and is termed FREEDOM CONCERN.

Life Roles Inventory - Values Scale

De Lecea(1982) reports the results of a study using a sample of 800 junior high school students, post secondary education students, and members of the work force in Spain. The version of the Values Scale employed assessed 18 values. A factor analysis of the scales resulted in 5 factors: Factor 1 is a SUCCESS FACTOR which loaded highest on Achievement, Economics, Prestige, and Authority; Factor 2

had highest loadings on Personal Development, Aesthetics, Ability Utilization, Altruism, Creativity, and Advancement and was named a SELF ACTUALIZATION FACTOR; Factor 3 was called PHYSICAL-SOCIAL ENTOURAGE and consisted of Social Relations, Social Interaction, Variety, and Work Conditions; Factor 4 was an INDEPENDENCE FACTOR which had high loadings on Autonomy and Life Style; Factor 5 loaded on Risk, Physical Activities, and Creativity and was designated a CHALLENGE FACTOR.

Shears(1982) administered LRI-VS to 1400 Grade 10 students in Australia. Five factors were extracted via factor analysis: Factor 1 includes Intellectual Stimulation, Creativity, Responsibility, Decision Making, Ability Utilization and was named INTELLECTUAL SATISFACTION AND RESPONSIBILITY; Factor 2 - an ECONOMIC AND STATUS FACTOR which loaded high on Economic Rewards, Prestige, Economic Security, Supervisory Relations, and Advancement; Factor 3 was called an OTHER AND SELF FACTOR and was best described by the Associates, Aesthetics, Altruism, and Spiritual Values scales; Factor 4 loaded high on Life Style, Autonomy, and Variety and was called a FREEDOM TO ESTABLISH ACTIVITIES FACTOR; Factor 5 was a PHYSICAL ACTIVITY AND RISK FACTOR and loaded on the two scales with the same labels as the factor.

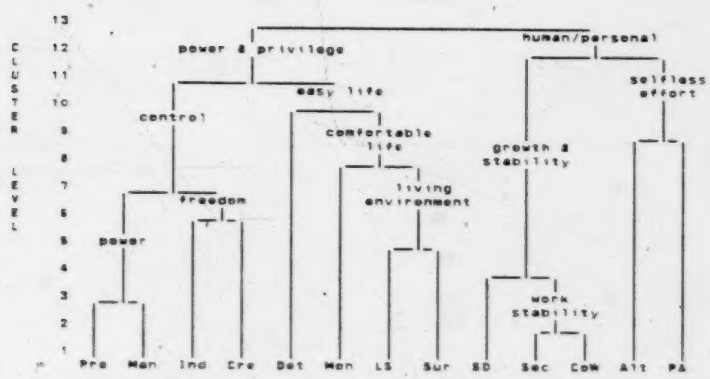
Fitzsimmon, Macnab, and Casserly(1984a) used principal components analysis with varimax rotation to explore the factor structure of the LRI-VS for a number of sub-groups of the Canadian national norming sample (Adults, post-secondary

students, high school students for French and English forms). In general, the same factor structure was found across all groups. The first factor loaded highly on Ability Utilization, Achievement, Advancement, Prestige, and Personal Development. This factor was called ACHIEVEMENT AND DEVELOPMENT. Factor 2 loaded on Altruism, Social Interaction, and Social Relations. This was designated as a SOCIAL ORIENTATION factor. Factor 3 had high loadings on Autonomy, Creativity, Life Style, and Variety and stressed INDEPENDENCE. Factor 4 stressed the importance of ECONOMIC CONDITIONS with highest loadings on Economics, Working Conditions, and Cultural Identity. Factor 5 was called a PHYSICAL RISK FACTOR and loaded highest on Physical Prowess, Physical Activity, and Risk.

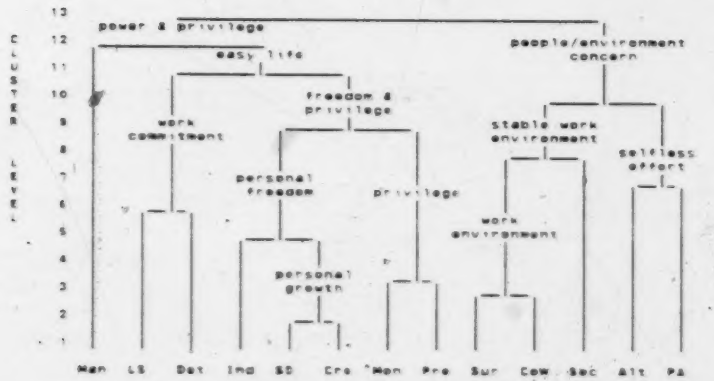
The Work Aspect Preference Scale

Pryor(1982) reports two studies with two versions of the WAPS. In each study he used a complete link clustering technique to look at different levels of generality of the preference domain. The dendograms for the complete link clustering solutions are presented in Figure 1. The first study used an earlier version of the WAPS(2) and the sample consisted of 532 grade 11 and 12 high school students. The second study used the present version of the WAPS(3) and the sample consisted of 482 grade 11 and 12 high school students.

Figure 1. Dendograms for complete link cluster analysis of the Work Aspects Preference Scale



Complete link solution using 13 WAPS subscales for 832 students



Complete link solution using the 13 WAPS subscales for 482 students

In both studies two similar clusters appear. In the first study the two main clusters are POWER AND PRIVILEGE and HUMAN/PERSONAL CONCERN. The POWER AND PRIVILEGE cluster suggests that a "comfortable and affluent life can be construed as one of the rewards for the exercise of power in the work situation". This cluster has certain similarities to the higher order "competitive" grouping of Lofquist and Dawis (1978). The other major cluster is termed HUMAN/PERSONAL CONCERN and implies the "importance of people in providing both a happy and enriching milieu for the individual and also providing the opportunity for dedicated service to others". This has certain similarities with the "non-competitive" higher order grouping of Lofquist and Dawis(1978). In the second study the POWER AND PRIVILEGE cluster is similar to that of the first study. The PEOPLE/ENVIRONMENT CONCERN cluster is a people oriented cluster suggesting a concern for growth and stability of workplace and a desire to help others through hard work. This is similar to the HUMAN/PERSONAL CONCERN cluster of the first study.

Summary

In summary it can be said that:

a. the above findings suggest that when factor analyses are carried out at the scale level on any of the 4 instruments between 4 and 6 factors provide an interpretable solution and a more parsimonious

framework for organizing work values, needs, or preferences.

b. some of the factors seem to be common across instruments. For example, a comparison of Bolton's (1978) WVI factors with those of Lofquist and Dawis (1978)of the MIQ show recognizable parallels: Achievement(Stimulating Work), Altruism(Interpersonal Satisfaction), Safety(Economic Security), Autonomy(Responsible Autonomy), Comfort(Comfortable Existence).

There are, however, a number of methodological considerations which weaken comparisons between instruments. There are differences in: the sample size - they vary from 48 subjects (Hendrix and Super,1968) to over 5000 (Lofquist and Dawis, 1978); the sample characteristics; the methods of analysis; and the methods for ascertaining the number of factors.

The present study will attempt to overcome some of these methodological weaknesses by using the same sample for all the data analyses, the same analysis for each instrument, and the same rules for factor extraction.

C. Values, needs, preferences, and occupational choice

In this section we draw upon a number of studies which suggest that needs, preferences, and values might be an important factor in career choice. Psychological differences among persons aspiring to or having different occupations

have long been of major interest to vocational psychologists and occupational sociologists. A number of authors working within the occupational self-selection framework (e.g., Holland, 1976) suggest that needs, preferences, and values are formed early in life and persist throughout an individual's work history and that people self-select themselves for occupations which are compatible with these already formed needs, preferences, and values. In this view it is hypothesized that occupational choice is a rational process in which persons try to maximize the occupational rewards that they most highly value (Blau, Gustad, Jessor, Parnes, and Wilcox, 1956). Similarly, Lofquist and Dawis(1969) hold the view that during the course of their work careers, individuals attempt to maximize the correspondence between their personal needs and the 'reinforcer system of the work environment'.

A number of studies have looked at the values, needs, and preferences of post-secondary students. It is assumed that, as a group, post-secondary students' ideas about work are relatively undisturbed by the specific conditions of the job situation in which they will eventually find themselves. It is therefore easier to observe the influence of abstract factors such as values, needs, preferences, and attitudes as they bear on the decision making process.

In an extensive study of occupational values and occupational choice, Rosenberg(1957) questioned several thousand university students about the fundamental reasons

for the selection of their occupational objective. He found that the students had three main value orientations: a people orientation (an opportunity to work with people rather than things); a reward orientation (a chance to earn a good deal of money and receive social status and prestige); and a self expression orientation (a chance to be creative and original).

Rosenberg found that the expression of values by students in different fields varied systematically. For example, students planning to enter drama, architecture, or journalism tended to emphasize creativity and ability utilization, that is, the self expression value complex. People oriented values were expressed by those students planning to enter social work, medicine, teaching, and personnel work, while those planning on an engineering or natural science career ranked these values lowest. Students planning to enter real estate, management, and business placed the greatest stress on money, status, and security, that is, the reward oriented value complex. Social workers, teachers, and social scientists placed considerably less stress on this. In addition, when students were tested 2 years later there was a significant reduction in the number of students who exhibited inconsistency between values and occupational choice. 54% of the inconsistent students had become consistent. In addition those who were consistent at the outset tended to stay consistent. This is supportive of Super's(1957) observation that undergraduate transfers are

often interpreted as the search for better fit between the student's personal orientation and his field of study.

These findings were confirmed by Schwarzweller(1959), who found that educational and occupational plans correlated with value orientation after controlling for sex, IQ, and paternal occupation. In a later study, Schwarzweller(1960) reported that the patterns found by Rosenberg(1957) were common across both sexes and across different geographical areas with widely different patterns of settlement and opportunity structure.

Simpson and Simpson(1960) administered questionnaires to 130 male university students in three different groups: business, science, and general studies. They found that the business students valued money and leisure highly and were uninterested in work itself and in occupational colleagues. Science students were more interested in work itself and in prestige amongst colleagues. The general studies students showed no common pattern.

Astin and Nichols (1964) mailed questionnaires concerning life goals to National Merit Finalists and to Commendation winners. A factor analysis of 56 life goals and self-rating items revealed 7 factors: Self-Esteem, Personal Comfort, Prestige, Altruism, Artistic Motivation, Scholarship, and Science and Technology. An analysis of these factors for this group of high aptitude students, divided into 36 fields, yielded systematic differences in life goals of students who were pursuing different careers.

Davis(1965) reports some general trends in occupational choice and values for 33,982 students from 135 colleges and universities in the U.S.A. Generally, people-oriented fields attract people who hold people-oriented values. On the other hand, freshmen in the biological sciences, engineering, and the physical sciences were already quite unlikely to endorse these values. The choice of humanities was associated with having values such as freedom from supervision, living and working in the world of ideas, and having the opportunity to be original and creative. The same values were low for business students. Business and law students were more money oriented than education, humanity, and social science students.

Kassarjan and Kassarjan(1965) found that 'other-directed' individuals tended to be less interested in science and engineering than 'inner-directed' individuals and that these two groups differed in their social values.

Normile (1967), using a 105 item forced choice version of the Work Values Inventory, found significant differences in specific work values between seven occupational groups. He reports that for Altruism, priests and psychiatrists scored higher than lawyers, engineers, accountants, psychologists, and teachers; psychologists and teachers have significantly higher scores than lawyers and engineers. On the Aesthetic value, priests scored higher than teachers and accountants; on Creativity teachers scored lower than psychiatrists and engineers; on Intellectual Stimulation

teachers scored lower than psychiatrists, lawyers, and engineers; on Independence lawyers scored higher than engineers; on Management engineers scored higher than psychologists and teachers; on Economic Returns priests scored lower than all other groups; on Security teachers were higher than psychologists and psychiatrists; and on Variety psychologists were higher than psychiatrists and priests.

Super(1968) reported differences in work values (measured by a 210 item forced choice form of the Work Values Questionnaire) for 156 business school students, 185 machinist students, and 85 Peace Corps trainees. The business students placed more importance on Management, Independence, Economic Returns, Security, and Surroundings, than do the Peace Corps teacher trainees. On the other hand, Peace Corps trainess placed more importance on Altruism, Esthetics, Creativity, Intellectual Stimulation, Variety, and Way of Life than did business students and machinist students. The machinist students placed more importance on Creativity, and Supervisory Relations than did the business students. The business students on the other hand placed more importance on Altruism, Management, and Way of Life. Fretz(1972) administered an occupational values questionnaire to 120 pre-professional students intended on studying law, medicine, business, and education. He found that these groups were distinguishable in terms of their values.

More general evidence for the relationship between values and occupational choice comes from a number of studies carried out by Cotgrove and Duff (1980,1981,1982), who report differences in social values of undergraduates in management, engineering, and economics and those in social sciences. The social science students were reported to have more "anti-industrial" values than the management, engineering, and economics students.

Pryor(1981) reports 2 studies using the Work Aspect Preference Scale with 2 samples of senior high school students. He found that the WAPS subscales significantly discriminated between individuals on the basis of their occupational preference.

Overall, the studies indicate differences in values, needs, and preferences held by aspirants to different occupational groups. The studies are mainly descriptive in nature with few of them testing the significance of differences between groups. Those studies that do look at significant differences between groups have failed to use a methodology that would emphasize the multi-dimensional nature of values, needs, and preferences, instead they concentrate on difference between individual values.

However, even with the above limitations, these studies empirically support the use of current occupational choice as a criterion for assessing the validity of the four instruments being examined. From the above it can be seen that there are few studies that look at the WVI, MIQ, WAPS,

or the LRI-VS in terms of their ability to discriminate between groups differing in occupational choice.

At the same time there is a lack of research that looks at the relative ability of psychological instruments to discriminate on the basis of various personal or organizational characteristics and no research has been conducted comparing any of the four scales. The selection of a specific instrument can be crucial for the practitioner, especially in terms of its predictive and/or concurrent validity. If the various instruments are similar in their ability to discriminate between students in different programs, then concerns such as ease of administration, scoring, and respondent fatigue may be deciding factors.

In summary, the review indicates that positive validity of instruments measuring values, needs, and preferences would be demonstrated if it could be shown that the subscales of the various instruments discriminate significantly between students taking different courses; that there are no studies with the WVI, MIQ, WAPS, and the LRI-VS in this regard; and that there are no studies comparing the validity of the WVI, MIQ, WAPS, and the LRI-VS.

D. Purpose of the Study

The general aim of the present study is to present an operational and empirical integration of the constructs of needs, preferences, and values as measured by the Minnesota

Importance Questionnaire, the Work Aspects Preference Scale, the Work Values Inventory, and the Life Roles Inventory - Values Scale. The literature review points out that there are a number of areas where there is a lack of information concerning the four scales and their interrelationships. These are reiterated below and represent an outline of the three main purposes of the present study.

1. There is a lack of knowledge about the relationships between standardized and widely used measures of work values, needs, and preferences. This limits the way in which the pragmatic and theoretical aspects of the concepts measured by these instruments are viewed. The study will explore the relationships between measures of values(Work Values Inventory, Life Roles Inventory - Value Scales), needs (Minnesota Importance Questionnaire), and preferences (Work Aspect Preference Scale).
2. A major interest in the area of work values, needs, and preferences is the study of the underlying structure or dimensionality of the various instruments. There have, however, been few attempts to integrate the results of studies utilizing different instruments. It is therefore difficult to make any generalizations about the structure underlying values, needs, and preferences or to make statements about the findings across studies. A second objective of the present study is, then, to explore the structure of the values, needs, and

preferences measured by the above instruments and compare and contrast these structures.

3. Although a variety of instruments is available which claim to be useful in assessing vocationally relevant characteristics, there is little research that makes it possible to systematically compare them. In addition there is a lack of research relating the Work Values Inventory, the Minnesota Importance Questionnaire, the Work Aspect Preference Scale, and the Life Role Inventory - Values Scale to occupational choice. The final goal of the present study is to look at and compare the concurrent validity of the 4 scales. Specifically, the ability of the various scales to differentiate between groups of students who are enrolled in different courses of study, will be assessed and compared.

III. Method

A. Sample

438 post-secondary students participated in this study. 342 (78%) were female and 96 (22%) were male. All subjects were volunteers. The subjects who participated were undergraduates at the University of Alberta and students at the Northern Alberta Institute of Technology. Approximately 1500 packages of questionaires were administered. 499 packages were returned of which 61 had incomplete data.

The data for all 438 students are used for parts 1 and 2 of the following results section. Part 3 of the results section uses a sub-sample, the nature of which is described in detail in that section.

B. Procedure

The students were administered a package which contained all four instruments and instructions for preparation and completion of the instruments. These instructions are presented in Appendix 1. The students were instructed to complete the instruments in any order.

C. Instruments

The four instruments which are examined in the present study were explained in detail in the literature review. They are the Minnesota Importance Questionaire (MIQ), the Work Aspects Preference Scale (WAPS), the Work Values

Inventory (WVI), and the Life Roles Inventory - Value Scales (LRI-VS).

Issues and solutions to design problems are outlined in the following chapter under the appropriate study.

IV. Results

This section of the thesis is organized into three studies. These three studies relate to the three problems outlined in Chapter 2, namely, investigating the relationship between needs, values, and preferences; investigating the structure of needs, values, and preferences and the similarity of the structure of the LRI-VS, the WVI, the WAPS, and the MIQ; and to evaluate the concurrent validity of the four instruments. Each of the studies is presented as a unit consisting of three sections: a brief synopsis of the issue or problem; the solution to the problem - outlining design and statistical procedures used; and a results section.

A. Study 1: Relationship between values, needs, and preferences

As outlined in section one of the literature review, there is a lack of knowledge about the relationships between standardized and widely used measures of values, needs, and preferences. It was pointed out that at an operational level these constructs suggest more similarity than their labels would imply; each of the four instruments measures what individuals consider important about their work or their lives. Further, it was shown that the instruments have a number of scales in common. In this context then one would expect that the common or matched scales would show high correlations across the four instruments. In addition, if the four instruments are measuring similar constructs we

would expect that the method variance would be smaller than the scale variance.

Solution to the problem

This part of the thesis will explore the relationship between the constructs of needs, preferences, and values as measured by the MIQ, WAPS, the WVI, and the LRI-VS. In order to examine the relationships between the four instruments in a stringent fashion it was decided to look at those subscales which overlap across all four instruments. The subscales were chosen on the basis of their operational definitions (see Tables 1,2,3, and 4). The eight subscales that will be examined are contained in Table 5. By examining these eight matched traits across the four methods of measuring them in a multitrait-multimethod design, evidence can be gathered to show the relative importance of method and trait variance. If method variance exceeds trait variance, then the four instruments could be considered to be measuring different aspects of the traits, on the other hand, if trait variance exceeds method variance, then it could be argued that the traits are more important than the methods and that they measure similar constructs independent of methods.

As mentioned above, it is proposed to approach the problem within the framework of Campbell and Fiske's(1959) multitrait-multimethod (MTMM)approach to investigating construct validity. Convergent and discriminant validity are

Table 5: Matched traits across the MIQ, WVI, LRI-VS, and WAPS

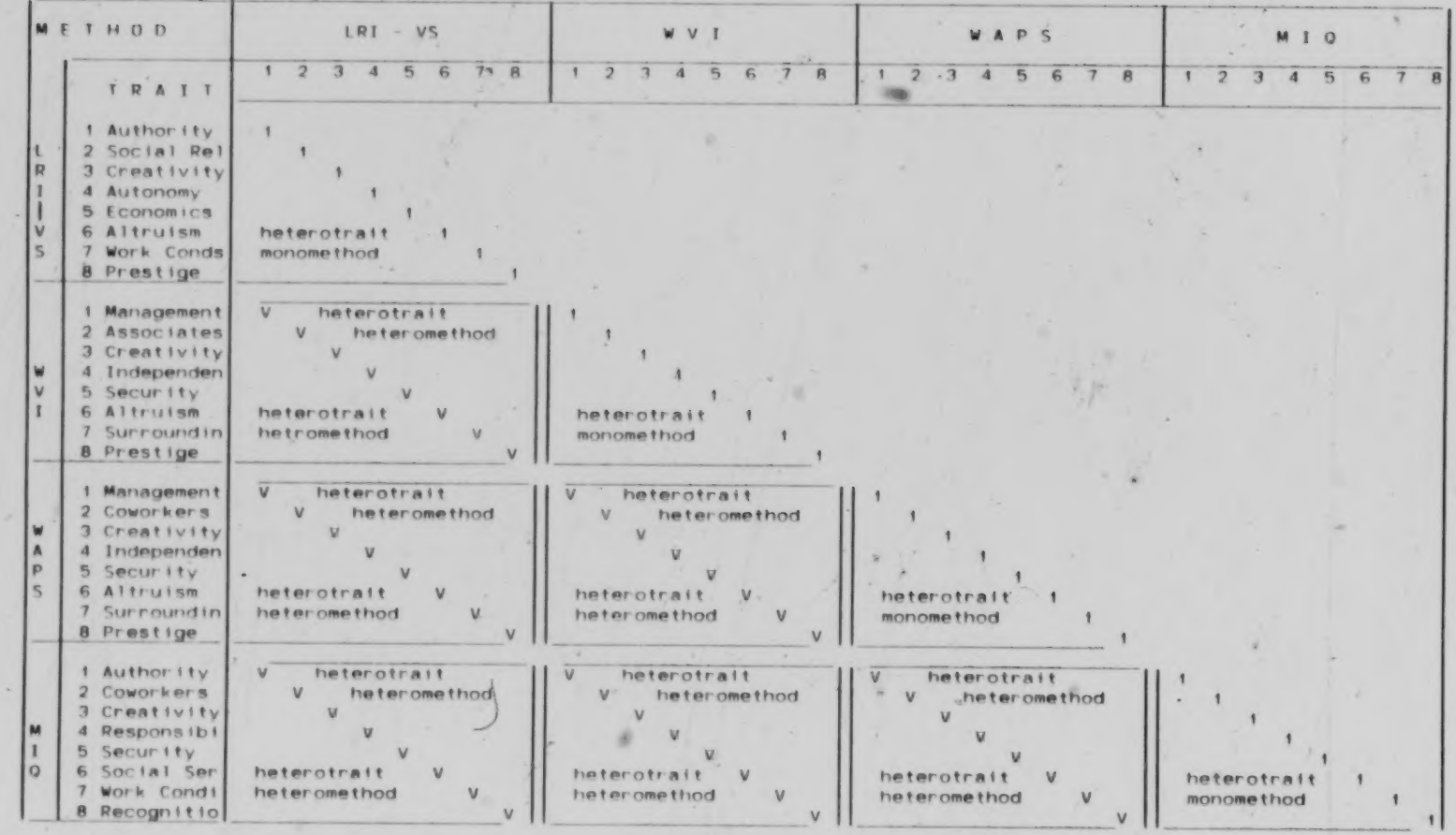
	LRI-VS	WVI	WAPS	MIQ
1.	Authority	Management	Management	Authority
2.	Social Relations	Associates	Co-workers	Co-Workers
3.	Creativity	Creativity	Creativity	Creativity
4.	Autonomy	Independence	Independence	Responsibility
5.	Economics	Security	Security	Security
6.	Altruism	Altruism	Altruism	Social Service
7.	Work Conditions	Surroundings	Surroundings	Work Conditions
8.	Prestige	Prestige	Prestige	Recognition

the two types of validity most closely associated with the MTMM approach. Convergent validity is based upon the correlation between responses obtained from different methods of measuring the same construct. Discriminant validity is determined by demonstrating that a measure does not correlate very highly with another measure from which it should differ (Campbell, 1960). In their classic paper Campbell and Fiske(1959) propose a heuristic methodology for investigating the multitrait-multimethod (MTMM) matrix. This type of matrix is defined by the intercorrelations among several traits, each measured by several methods. Figure 2 illustrates the MTMM matrix used in the present study.

The diagonal submatrices of the MTMM matrix are referred to as the heterotrait-monomethod blocks and are the correlations between different traits measured by the same method. The off-diagonal submatrices are labelled the heterotrait-heteromethod blocks and represent the correlations between different traits measured by different methods. The diagonal elements of these blocks are the correlations between similar traits measured by different methods. These are known as the validity coefficients and are labelled with a "V". Thus, the variance in the MTMM matrix can be due to method variance and to trait variance.

Two analytic methods were employed. In the first, Campbell and Fiske's(1959) guidelines were used to assess convergent and discriminant validities through an examination of the correlation coefficients between similar

Figure 2: Multitrait Multimethod Matrix for 4 methods and 8 traits



and dissimilar traits across all four instruments. In the second, an analysis of the MTMM matrix was completed using confirmatory factor analysis (CFA).

Campbell and Fiske (1959) suggested four informal criteria for the purposes of evaluating the MTMM matrix.

Campbell and Fiske criteria

The first criterion is for convergent validity. This criterion suggests that correlations between similar traits or scales measured by different methods be significantly different from zero and large enough "to encourage further examination of validity".

Campbell and Fiske(1959) provide three discriminant validity criteria. The first criterion to be met for discriminant validity is that correlations between similar traits measured in different ways exceed correlations between dissimilar traits measured in different ways. That is, the validity coefficients for a trait should be higher than the correlations obtained between that variable and any other variable having neither trait nor method in common. These coefficients are found in the heterotrait-heteromethod blocks.

The second criterion to be met for discriminant validity is that the correlation between similar traits measured by different methods (convergent validity coefficients) exceed correlations between dissimilar traits measured by the same method. For a given variable this

involves comparing its values in the validity diagonal to its values in the heterotrait-monomethod triangles. This is a more stringent criterion which requires that common trait variance exceed common method variance.

The final discriminant criterion states that the pattern of trait intercorrelations should be replicated within all heterotrait-monomethod and heterotrait-heteromethod triangles.

In the original Campbell and Fiske(1959) discussion there are very few formal assessment methods proposed for making and evaluating the necessary comparisons. As Jackson(1969) points out, the Campbell and Fiske criteria do not provide an objective, quantitative estimate of the degree of fit of the MTMM matrix to the requirements for convergent and discriminant validity. The criteria are informal and tend to be subjective. There is a lack of specification as to what constitutes satisfactory results. Although Campbell and Fiske conceptualize a clear distinction between trait and method variance the criteria do not allow the researcher to clearly distinguish between them. A related but more serious problem with the Campbell and Fiske criteria is that they are based upon the correlations between observed variables but make interpretations about latent method and trait factors (Marsh and Hovecar,1983). Therefore, an alternative procedure for assessing the MTMM matrix was also used. This is outlined below.

Confirmatory Factor Analysis

As with any other correlation matrix, MTMM matrices can be factor analyzed to infer underlying constructs. The use of confirmatory factor analysis for assessing convergent and discriminant validity with MTMM matrices has been suggested by a number of writers(Joreskog,1973; Kenny, 1976; Schmidt, 1980; Marsh and Hocever, 1983,1984a, 1984b). The present study will use the methodology proposed by Marsh and Hocevar(1984a).

In confirmatory factor analysis one starts with a hypothesis about the factorial structure thought to be responsible for the observed covariance structure. In this study, the notation, model specification, and actual analysis were carried out with the commercially available program LISREL VI (Joreskog and Sorbom, 1984). This program embodies Jorekog's maximum likelihood approach to confirmatory factor analysis. The program allows the user the possibility to specify latent trait and method factors by fixing and constraining parameters. The models formulated in the following analyses require the specification of three different matrices:

1. the LAMBDA X matrix which is a matrix of factor loadings conceptually similar to a rotated factor matrix;
2. the PHI matrix which contains the correlations between the factors;
3. the THETA DELTA matrix which contains the error/uniqueness of each measured variable and is

conceptually similar to one minus the communalities that result from common factor analysis.

The user is then able to specify the nature of the elements of the parameter matrices of a model. Any particular element of these matrices may be specified in one of three ways:

1. as a FIXED parameter, which is assigned a value prior to the analysis and does not change during the estimation process;
2. as a CONSTRAINED parameter whose value is unknown but is set equal to that of another parameter;
3. as a FREE parameter, whose value is estimated from the data conditional on the values of fixed and constrained parameters in a model.

On the basis of the LAMBDA X, PHI and THETA DELTA matrices, with their set of constraints, LISREL VI attempts to minimize a maximum-likelihood loss function that is based upon differences between the original and reproduced correlation matrices.

The MTMM application considered here consisted of four method factors (the LRI-VS, the WVI, the WAPS, and the MIQ) and 8 trait factors(1,2,3,4,5,6,7,8). All 12 factors appear in the General confirmatory factor analysis model presented below.

The LAMDA X matrix for the general model used in this study is presented in Figure 3. Method factors are defined by responses to the 8 variables within each method. The trait factors are defined by assessment of each trait across

Figure 3: Hypothesized factor structure matrix for the General Model (4 method factors and 8 trait factors)

		METHOD FACTORS											
		LRI-VS	WVI	WAPS	MIQ	1	2	3	4	5	6	7	8
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	1 Authority	1	0	0	0	1	0	0	0	0	0	0	0
L	2 Social Relations	1	0	0	0	0	1	0	0	0	0	0	0
R	3 Creativity	1	0	0	0	0	0	1	0	0	0	0	0
I	4 Autonomy	1	0	0	0	0	0	0	1	0	0	0	0
|	5 Economics	1	0	0	0	0	0	0	0	1	0	0	0
V	6 Altruism	1	0	0	0	0	0	0	0	0	1	0	0
S	7 Work Conditions	1	0	0	0	0	0	0	0	0	0	1	0
	8 Prestige	1	0	0	0	0	0	0	0	0	0	0	1
	1 Management	0	1	0	0	1	0	0	0	0	0	0	0
	2 Associates	0	1	0	0	0	1	0	0	0	0	0	0
	3 Creativity	0	1	0	0	0	0	1	0	0	0	0	0
W	4 Independence	0	1	0	0	0	0	0	1	0	0	0	0
V	5 Security	0	1	0	0	0	0	0	0	1	0	0	0
I	6 Altruism	0	1	0	0	0	0	0	0	0	1	0	0
	7 Surroundings	0	1	0	0	0	0	0	0	0	0	1	0
	8 Prestige	0	1	0	0	0	0	0	0	0	0	0	1
	1 Management	0	0	1	0	1	0	0	0	0	0	0	0
	2 Coworkers	0	0	1	0	0	1	0	0	0	0	0	0
W	3 Creativity	0	0	1	0	0	0	1	0	0	0	0	0
A	4 Independence	0	0	1	0	0	0	0	1	0	0	0	0
P	5 Security	0	0	1	0	0	0	0	0	1	0	0	0
S	6 Altruism	0	0	1	0	0	0	0	0	0	1	0	0
	7 Surroundings	0	0	1	0	0	0	0	0	0	0	1	0
	8 Prestige	0	0	1	0	0	0	0	0	0	0	0	1
	1 Authority	0	0	0	1	1	0	0	0	0	0	0	0
	2 Coworkers	0	0	0	1	0	1	0	0	0	0	0	0
	3 Creativity	0	0	0	1	0	0	1	0	0	0	0	0
M	4 Responsibility	0	0	0	1	0	0	0	1	0	0	0	0
I	5 Security	0	0	0	1	0	0	0	0	1	0	0	0
Q	6 Social Service	0	0	0	1	0	0	0	0	0	1	0	0
	7 Work Conditions	0	0	0	1	0	0	0	0	0	0	1	0
	8 Recognition	0	0	0	1	0	0	0	0	0	0	0	1

the four methods. The 64 elements used to define these factors are "free" and are designated with a 1 in Figure 3. Other values in the LAMBDA X matrix are fixed to zero.

The correlations among the factors are specified in the PHI matrix. In most of the models discussed the factors are oblique (i.e. correlated). Correlations among the traits factors and among the method factors are estimated, while correlations between method and trait factors are assumed uncorrelated and these values are fixed to zero. The pattern for the general model is presented in Figure 4.

The elements of the THETA DELTA matrix represent a combination of the error and uniqueness in each measured variable. These are assumed uncorrelated and the matrix is specified to be diagonal.

Marsh and Hocevar(1984) outline a series of confirmatory analyses that provide a general approach to assessing MTMM matrices. As outlined above, a General Model which specifies trait and method factors is used to provide an overall estimate of trait and method variance. Alternative models are proposed which allow the user to make further tests of the data. The first set of alternative models looks at the relative importance of trait and method factors. The second set of models explores the consequences of requiring trait and/or method factors to be uncorrelated. The third set of alternative models explores the consequences of placing equality constraints on the parameters. The fourth set of alternative models looks at

Figure 4: Model for the correlation between factor (PHI matrix) for the General Model

		METHOD FACTORS				TRAIT FACTORS							
		LRI-VS	WVI	WAPS	MIQ	1	2	3	4	5	6	7	8
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
LRI-VS	I												
WVI	II	1											
WAPS	III	1	1										
MIQ	IV	1	1	1									
Authority	V	0	0	0	0								
Social/Assocs	VI	0	0	0	0	1							
Creativity	VII	0	0	0	0	1	1						
Independence	VII	0	0	0	0	1	1	1					
Security/Econom	IX	0	0	0	0	1	1	1	1				
Altruism	X	0	0	0	0	1	1	1	1	1			
Work Conditions	XI	0	0	0	0	1	1	1	1	1	1		
Prestige	XII	0	0	0	0	1	1	1	1	1	1	1	

the consequences of combining individual traits.

Goodness-of-fit

The degree of fit of any hypothesized model can be tested. Joreskog(1967, 1970, 1973) has described a chi-square test of fit which is also part of the output of the LISREL VI program. However, there are serious drawbacks to using the statistic. The significance of the test is directly dependent on sample size such that given a sufficiently large sample the goodness-of-fit statistic has sufficient power to detect minute deviations from the model being tested. On the other hand, if one uses small samples the model will almost always accept the fit of the model to the data (Bentler and Bonnet,1980). Consequently, it is necessary to evaluate how well the model captures the information in the sample covariance matrix by a method that is independent of sample size.

Alternative procedures have been proposed, including the residual correlation matrix, the chi-square/degrees of freedom ratio and a number of reliability coefficients. The present study used the Tucker and Lewis(1973) reliabilty coefficient. This coefficient represents the ratio of the amount of covariation explained by a model to the total amount of covariation available to be explained by the model. This coefficient requires that the model being tested be compared to a NULL model which predicts no relationship between the variables. The Null model used in the present

study is a variance-covariance matrix of observed variables which is hypothesized to be diagonal with all off-diagonal elements equal to zero. The Tucker-Lewis coefficient measures the proportional reduction in the adjusted discrepancy between the null model and the model being tested. It therefore ranges between 0 and 1. The former represents the poorest fit and the latter a complete fit. In addition to the Tucker-Lewis reliability coefficient, the mean of the residual correlation matrix will be calculated for all models to give an additonal measure of the goodness-of-fit. The smaller the mean of the residual correlation matrix the better the fit.

Comparing Alternative Models

It is possible to make comparisons of different models and to judge whether the fit improves when additional parameters are specified for a model, or whether the fit deteriorates when parameters are deleted. Comparisons of the degree of fit of alternative models can also be tested. This is done by comparing the differences between the chi-square values of the two models. This difference is distributed as a chi-square with degrees of freedom equal to the difference in the degrees of freedom of the two models. This is only true for nested models where no new variables are specified. (Kenny, 1976).

Results:Campbell and Fiske Criteria

Table 6 shows the MTMM matrix for the LRI-VS, WVI, WAPS, and MIQ for eight matched traits. The convergent validities (the underlined values in the diagonals of the square submatrices) are statistically significant and substantial.

Table 7 shows the average convergent validity coefficients for each trait by method, methods across all traits, and traits across all methods. The WVI showed the highest convergent validity coefficients for Authority, Social Relations, Creativity, Autonomy, Altruism, and Working Conditions. The WAPS showed the highest convergent validity coefficients for Economics and Prestige. The LRI-VS showed the lowest coefficients for Social Relations. The MIQ showed the lowest convergent validity coefficients for all other variables. Overall, the WVI showed the highest average convergent validity, followed by the WAPS, the LRI-VS and the MIQ. The trait showing the highest average convergent validity was Altruism. The lowest average convergent validity was for Authority. The overall mean convergent validity was .59. Thus, evidence for the convergent validity is provided.

The convergent validity coefficients (mean r=.59) are substantially higher than the other correlations within the heterotrait-heteromethod submatrices (mean r=.16). The percentage of convergent validities exceeding the hetrotrait-heteromethod correlations was 100% for the LRI,

Table 6: Multitrait-Multimethod Matrix for 8 matched traits for the LRI-VS, WVI, WAPS, and the MIQ

		Life Roles Inventory - VS								Work Values Inventory								Work Aspects Preference Scale								Minnesota Importance Quest						
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7
L	2	12																														
R	3	37	11																													
I	4	48	07	55																												
	5	27	25	04	17																											
V	6	19	29	19	06	-12																										
S	7	22	31	12	14	44	11																									
	8	48	29	19	22	49	06	29																								
	1	58	10	26	25	19	16	15	36																							
	2	26	50	08	-00	19	26	21	39	33																						
W	3	34	13	73	43	-03	26	10	18	41	16																					
V	4	36	09	43	64	10	09	13	21	42	07	55																				
I	5	18	21	-01	01	65	-02	39	39	21	32	-01	04																			
	6	12	29	16	02	-15	79	10	05	20	29	33	12	-00																		
	7	22	30	13	12	35	18	65	29	31	38	21	22	43	20																	
	8	39	29	17	20	40	06	27	68	48	54	25	32	41	09	38																
	1	50	06	23	17	21	14	13	29	67	23	24	23	26	15	18	33															
	2	20	46	09	-02	24	25	24	38	23	68	15	04	34	26	36	45	25														
W	3	30	08	74	36	-02	24	13	18	32	14	75	41	-00	24	18	20	33	23													
A	4	25	10	31	50	09	08	15	15	25	08	37	66	04	07	18	24	20	19	37												
P	5	22	19	-01	-00	65	-02	39	38	18	23	-04	-02	84	-00	37	35	31	39	02	06											
S	6	13	25	24	04	-14	75	08	06	20	23	37	17	-01	83	15	09	21	34	37	18	03										
	7	19	26	09	08	39	09	63	29	25	35	12	16	43	14	72	36	25	47	22	25	46	14									
	8	38	24	10	13	42	04	23	70	40	44	14	19	43	05	32	77	37	53	21	26	44	13	42								
	1	36	02	14	14	14	-06	04	19	45	13	17	15	13	-04	06	20	39	12	15	08	11	-00	09	21							
	2	06	43	03	-09	09	21	12	18	15	52	05	-03	13	23	20	08	10	54	06	02	14	22	20	23	26						
	3	24	09	47	34	-03	20	00	07	24	06	52	37	-12	20	07	04	12	06	49	23	-14	21	00	00	32	28					
M	4	28	00	30	44	-00	10	-03	04	23	-01	31	42	-13	11	00	-00	12	-03	27	31	-12	14	-00	00	39	18	68				
I	5	07	10	-11	-09	51	-01	26	20	03	10	-13	-16	61	-07	22	11	08	25	-08	-10	66	-05	29	22	16	23	-05	-03			
Q	6	05	18	03	-04	-17	67	-01	-02	12	19	20	02	-04	68	08	-00	09	24	17	-00	-03	61	05	01	05	38	32	25	05		
	7	11	27	03	01	25	10	45	14	09	21	08	02	25	14	50	11	05	27	04	05	25	09	49	14	24	44	20	23	39	22	
	8	30	17	05	12	36	-11	10	56	28	26	07	13	23	-07	13	46	19	28	06	11	24	-06	18	53	43	33	23	29	26	00	28

Note: Decimals are ommited; N=438; all correlations >.14 are significant at p< .01. Convergent validities are underlined.

WVI and the WAPS; and 99% for the MIQ. In actual fact, only 4 of 1344 comparisons failed to meet the first discriminant validity criteria. Thus, support is strong for this Campbell and Fiske discriminant validity criterion.

Convergent validity coefficients (mean r=.59) are substantially higher than the correlations within the heterotrait-monomethod triangles (mean r=.26). As Table 8 shows, the second discriminant validity criterion was met for 96% of comparisons. These proportions are certainly high as Campbell and Fiske intended that these values approach 100%. Similarly, high proportions are presented for the traits with traits 5, 6, 7, and 8 meeting the criterion in 100% of the cases.

The third discriminant validity criterion compares the patterns of the correlation coefficients across different portions of the MTMM matrix. This pattern is difficult to assess because of the size and number of triangles. Kendall's coefficient of concordance (Siegel,1959) was calculated by rank ordering the correlation coefficients in each triangle and then comparing the rank orders across all triangles. The LRI, WVI, and WAPS had coefficients of concordance of .89. The MIQ had a coefficient of .85. Overall the coefficient of concordance was .85. All coefficients were significant (p .0001).

Table 7 Average convergent validities by trait and method

	TRAIT 1	2	3	4	5	6	7	8	Method Average
LRI	48	46	64	53	60	74	58	65	58
WVI	57	57	67	57	70	77	62	64	64
WAPS	52	56	66	49	72	73	61	67	62
MIQ	40	50	49	39	59	65	48	52	50
Trait Average	49	52	62	50	65	72	57	62	59

Table 8 Proportion of convergent validities exceeeding hetero-mono values.

	TRAIT 1	2	3	4	5	6	7	8	Method Average
LRI	85	100	90	100	100	100	100	100	97
WVI	95	90	95	100	100	100	100	100	98
WAPS	100	90	100	90	100	100	100	100	98
MIQ	76	95	76	80	100	100	100	100	91
Trait Average	89	94	90	93	100	100	100	100	91

Results:Confirmatory Factor Analysis

The parameter estimates generated by the LISREL VI program for the General Model appear in Tables 9 and 10. The chi-square value for the model is statistically significant. The chi-square/degrees of freedom ratio is only 2.29 and the Tucker-Lewis reliability coefficient is .943, the mean of the residual correlation matrix is only .056 which indicate a good fit to the data. Table 9 presents the parameter estimates for the LAMBDA X matrix and the THETA DELTA diagonal. In general, loadings of the variables on the corresponding trait factor are quite high, indicating that each of the trait factors is well defined. Values for the method factors are generally lower, but high enough to indicate a method effect.

Table 10 presents the correlations among the factors (PHI matrix). These are moderate to low for the trait factors. The correlations among the the LRI-VS, WVI, and WAPS are higher than for the correlation of these three with the MIQ. The trait factor four (Autonomy/Independence/Responsibility) shows the lowest factor loadings of the eight trait factors. The values presented in Table 9 can also be used to derive summary statistics as described by Joreskog(1974) and Marsh and Hocevar(1983,1984). The trait variance is obtained by squaring the factor loadings attached to each trait factor and adding them. Similarly, the method variance is obtained by squaring the factor loadings attached to the method

Table 9. Confirmatory factor analysis parameter estimates for the General Model
Four method and eight trait factors

		METHOD FACTORS				TRAIT FACTORS								THETA
		LRI	WVI	WAP	MIQ	1	2	3	4	5	6	7	8	DELTA
		I	II	III	IV	V	VI	VI	VIII	IX	X	XI	XII	
	1 Authority	69				47								325
L	2 Social relations	26					58							627
R	3 Creativity	45						75						221
I	4 Autonomy	64							54					262
	5 Economics	42								67				406
V	6 Altruism	28									86			229
S	7 Work Conditions	41										71		369
	8 Prestige	50											66	284
	1 Management		59			69								186
	2 Associates		50				72							253
	3 Creativity		49					76						183
W	4 Independence		66						61					184
V	5 Security		35							88				158
I	6 Altruism		28								90			130
	7 Surroundings		52									74		229
	8 Prestige		61										63	185
	1 Management			42		72								310
	2 Coworkers			54			71							216
W	3 Creativity			45				78						188
A	4 Independence			60					49					406
P	5 Security			33						87				112
S	6 Altruism			35							85			179
	7 Surroundings			54								72		204
	8 Prestige			55									71	132
	1 Authority				48	48								530
	2 Coworkers				47		66							366
	3 Creativity				68			48						288
M	4 Responsibility				75				36					277
I	5 Security				24					77				398
Q	6 Social Service				33						73			357
	7 Work Conditions				49							66		402
	8 Recognition				52								62	404

Table 10: Confirmatory factor analysis parameter estimates for the General Model PHI matrix

		METHOD FACTORS				TRAIT FACTORS							
		LRI-VS	WVI	WAPS	MIQ	1	2	3	4	5	6	7	8
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
LRI-VS	I	100											
WVI	II	74	100										
WAPS	III	66	77	100									
MIQ	IV	39	36	32	100								
Authority	V	00	00	00	00	100							
Social/Assocs	VI	00	00	00	00	12	100						
Creativity	VII	00	00	00	00	22	-04	100					
Independence	VII	00	00	00	00	06	-46	46	100				
Security/Econom	IX	00	00	00	00	19	29	-20	-27	100			
Altruism	X	00	00	00	00	09	-34	27	-05	-10	100		
Work Conditions	XI	00	00	00	00	05	34	-05	-21	49	08	100	
Prestige	XII	00	00	00	00	29	41	-12	-27	44	-11	19	100

factors and adding them. The error variance is obtained from the unsquared values in the THETA DELTA diagonal. Table 11 summarizes the method, trait, and error variance across all 4 instruments for the General model. Overall the trait variance is about twice as high as the method variance. The trait variance component exceeds the method variance for all traits except trait 4. Also included in Table 11 is the trait, method, and error variance attached to each method. The WVI shows the largest method variance but also the largest trait variance. The MIQ shows the smallest trait variance. Since the goodness-of-fit indices for the General model show that the model provides a good fit to the data it is possible to compare other theoretical models to it to explore alternate explanations for the variance in the MTMM matrix.

Alternative models

A series of alternative models were derived and their ability to fit the data was examined. These models, including the General Model and the Null model, are summarized in Table 12, along with their chi-square, degrees of freedom, chi-square/degrees of freedom ratio, Tucker-Lewis reliabilities(p), the mean of the residual correlation matrix (MRC), and the difference in chi-square values between an alternative model and the General Model, the difference in degrees of freedom, and the significance of the chi-square difference. These models are useful in

Table 11: Partitioning of variance due to Method, Trait, and Error for the General Model

	Method	Trait	Error
Average for traits across methods			
1 Authority	.31	.36	.34
2 Coworkers	.21	.45	.37
3 Creativity	.28	.50	.22
4 Independence	.44	.28	.28
5 Security	.12	.64	.27
6 Altruism	.10	.67	.22
7 Work Conditions	.24	.50	.30
8 Prestige	.30	.43	.25
Average for method across all traits			
LRI-VS	.23	.44	.34
WVI	.27	.56	.19
WAPS	.23	.55	.22
MIQ	.26	.37	.37
Overall Average	.248	.479	.281

Table 12: Goodness-of-fit indices for alternative models

Model description	Chi-square (df)	Chi-square/df	p	MRC	Chi-square diff (df)
1. General Model -4 correlated method factors 8 correlated trait factors no correlation between trait and method factors	910 57 (398)	2 29	943	056	
2. 1 general factor with loadings on all 32 variables	7488 25 (464)	16 14	33	175	6577 68 (66) *
3. 4 correlated method factors	7209 04 (458)	15 74	35	172	6298 47 (60) *
4. 1 general factor and 4 correlated method factors no correlation between general and methods	5184 01 (426)	12 17	51	119	4273 44 (28) *
5. 8 correlated trait factors	2435 56 (436)	5 59	80	075	1524 99 (38) *
6. 1 general and 8 correlated trait factor no correlation between general and trait factors	1586 50 (404)	3 93	87	054	675 93 (6) *
7. 4 UNcorrelated trait method and 8 correlated trait factors no correlation between method and trait factors	989 26 (404)	2 45	936	063	78 69 (6) *
8. 4 correlated method factors 8 UNcorrelated trait factors no correlation between method and trait factors	1390 11 (426)	3 26	90	116	479 54 (28) *
9. 4 UNcorrelated method factors 8 UNcorrelated trait factors no correlation between method and trait factors	1780 90 (432)	4 09	86	188	870 33 (34) *
10. General model Equal loadings on method factors	did not converge				
11. General Model Equal loadings on trait factors	1101 34 (422)	2 61	929	063	190 77 (24) *
12. General Model Equal error parameters	1446 06 (429)	3 37	896	063	535 49 (31) *
13. 4 correlated methods 7 correlated traits(3 and 4 combined) no correlation between method and trait factors	1014 24 (405)	2 50	934	164	103 67 (7) *
NULL model	10252 88 (432)	23 73		280	

* p < .01

evaluating the extent to which various assumptions concerning the data matrix are important and they provide some information concerning discriminant and convergent validity.

Model 2:One general factor. This model tests whether or not the data can be accounted for by a general factor with loadings on each of the 32 variables. This model assumes that there are no method and no trait factors. As such it provides a good test of whether any discriminant validity exists within the MTMM matrix. This model results in a very poor fit to the data (p=.33) and a mean residual correlation of .175. Thus, providing evidence for discriminant validity.

Model 3:Four method factors. This model tests whether or not the data can be accounted for by four method factors but no trait factors, again testing the complete lack of discriminant validity. This model results in a poor fit to the data (p=.35; MRC=.172), thus it provides evidence for discriminant validity.

Model 4:One general factor and four method factors. This model combines models 2 and 3 and again results in a poor fit to the data (p=.55) again providing evidence for discriminant validity.

Model 5 and Model 6:Eight trait factors(with or without a general factor). These two models each hypothesize that the intercorrelations among the variables can be accounted for with a complete lack of method effect. These two models give a much better fit than models 2 through 4, but not as

good a fit as the General Model; the differences in chi-square values are highly significant.

Models 2 through 6. A comparison of models 2 through 6 is supportive of the information presented in Table 11 concerning the amounts of trait and method variance. The postulation of models that include 8 trait factors versus those that propose no trait factors leads to a better fit to the data. This suggests that variations in the MTMM matrix are more attributable to differences in traits than to differences in methods of measurement. Also, moving from a model that hypothesizes 8 trait factors to one that hypothesizes one single factor resulted in a large drop in the degree of fit to the observed correlation matrix, indicating that different traits were being measured.

Models 7 through 9. The next set of models - models 7 through 9 - explores the consequences of requiring trait and/or method factors to be uncorrelated. Model 7 with eight correlated trait and four uncorrelated method factors, provides nearly as good a fit to the data as the General model. However, the differences in chi-square values are highly significant. Hypothesizing that the trait factors be uncorrelated either alone or in combination with uncorrelated method factors produces a poorer fit to the data and to models that are significantly different from the General Model. This suggests that the trait factors are truly correlated.

Models 10 through 12. These models constitute a third set of alternative models which explore the consequences of placing equality constraints on various sets of model parameters. These constraints will, in general, result in a poorer fit to the data unless the values happen to be exactly the same as when the General model was fit. If the values differ by no more than chance, the difference in chi-square values would not reach statistical significance. Model 10 specified that the eight method-factor loadings for each method be constant across all traits. This model did not converge and will not be discussed further. Model 11 specified that the trait factor loadings for each trait be constant across the different methods. This model produces a good fit to the data (.936) and suggests that the trait-factor structure is invariant across the four methods of measurement. However, the chi-square value does differ significanly from the General model. Similarly, model 12 hypothesizes that the error/uniqueness terms are equal across all variables, testing the invariance of the error in each factor across different methods. This model provides poorer fit to the data than does the general model suggesting that the error terms are indeed different across the 32 variables.

Model 13. This alternative model tests the consequences of combining individual factors. In the present study factor 3 and factor 4 are most highly correlated and conceptually related as well. This suggests that the combination of the

two will lead to a better description of the data. The Tucker-Lewis reliability coefficient shows that the model fits the data well (p=.934). However, the mean of the residual correlation matrix is almost three times the value of the General Model and the difference between the chi-squares of this model and the General model are significant.

The analysis of the alternative models further supports the statements made about the General model. In general, although significant portions of the variance are explained by the trait and method factors, trait factors are much more important. The elimination of correlations among trait factors produces a significantly poorer fit to the data, arguing that the traits are truly correlated. The combination of traits leads to a significantly poorer fit than the general model.

Summary

This study concerned itself with the relationships between the LRI-VS, the WVI, the WAPS, and the MIQ. In order to accomplish this, eight traits were selected from amongst the scales measured by the 4 instruments. These traits were matched either by name or by operational definition. It was argued that by examining these eight matched traits across the four methods of measuring these eight traits in a multitrait-multimethod design that evidence could be gathered to show the relative importance of method and variance.

Correlations between each of the eight matched scales were consistently high demonstrating convergent validity. The agreement of each scale was relatively independent of agreement on other dimensions demonstrating discriminant validity as well. Although the scales contain some method variance attributable to instruments, the magnitude of this variance was smaller than variance attributable to traits, as shown by the results of the various confirmatory factor analyses. Taken together these results provide strong evidence for the generalizabity of traits across methods and that the LRI-VS, the WVI, the WAPS, and the MIQ are measuring similar constructs.

B. Study 2: The structure of the MIQ, WAPS, WVI and LRI-VS and the relationship between the structures

The second part of the literature review indicated that there was a great deal of emphasis in the work motivation literature on the structure of the domain. Although many factor analytic studies have been carried out on the four instruments there are few studies which specifically relate the findings from different studies and from different instruments. Previous research indicates that the structures of the instruments have some similarity. However, no research has been carried out to explore these similarities. This part of the thesis will attempt to provide some information about the structure of the MIQ, the WAPS, the

WVI, and the LRI-VS. In addition, the study will attempt to explore the relationship between these structures and outline the nature of the similarities of these structures.

Solution to the Problem

This part of the thesis will explore the factor structure of needs, preferences, and values as measured by the MIQ, WAPS, WVI, and the LRI-VS and the relationship between them. Principal Components Analysis was used to assess the factor patterns underlying each instrument. In each of the four analyses reported, factors were extracted on the basis of having eigenvalues greater than 1.0, and on factor interpretability. These were then rotated to orthogonal simple structure by the Varimax procedure. The factors were interpreted in comparison to previous factor analytic studies. In addition, factor scores were calculated for each instrument using the regression method. The factor scores for each instrument were then compared, in a pairwise fashion, using correlations and canonical correlations, to assess the degree of similarity of the factor patterns of the instruments. The canonical variate correlations will be used to help characterize the nature of the relationships.

Principal Components Analysis of the MIQ

Table 13 presents the correlation matrix for the 20 MIQ variables. The results of the principal components analysis for the MIQ are presented in Table 14. Five factors were

Table 13: Intercorrelation coefficients for the Minnesota Importance Questionnaire

Needs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 Ability Utilization																			
2 Achievement	59																		
3 Activity	39	38																	
4 Advancement	28	34	22																
5 Authority	27	27	17	44															
6 Company Policies	29	30	25	20	22														
7 Compensation	22	27	13	47	30	33													
8 Co-Workers	37	45	35	22	26	30	27												
9 Creativity	52	36	19	16	33	17	11	29											
10 Independence	31	23	30	13	14	13	10	11	31										
11 Moral Values	21	20	02	-07	-02	43	10	12	17	05									
12 Recognition	35	49	19	54	43	20	42	33	23	13	-06								
13 Responsibility	46	40	22	23	40	24	17	19	69	41	15	30							
14 Security	22	25	34	43	17	23	39	24	-05	14	00	27	-04						
15 Social Service	42	29	26	-09	05	23	-06	39	33	13	28	01	26	06					
16 Social Status	22	31	14	34	32	12	27	39	23	11	-05	52	27	16	16				
17 Supervision-Human	32	30	23	23	22	61	24	33	19	08	24	22	17	24	28	19			
18 Supervision-Technical	30	25	26	26	28	56	25	33	16	22	19	22	15	25	26	19	59		
19 Variety	42	34	51	20	32	20	13	36	41	31	04	16	40	09	28	24	18	18	
20 Working Conditions	41	38	29	30	24	42	37	44	21	28	18	29	24	40	23	27	37	42	28

Table 14
Principal Components Analysis with Varimax Rotation
Minnesota Importance Questionnaire

NEEDS	Rotated factor loadings I	II	III	IV	V	h**2
Ability Utilization	15	26	50	38	33	59
Achievement	31	20	33	47	26	53
Activity	03	07	16	28	76	69
Advancement	78	08	09	-02	23	67
Authority	59	10	38	07	00	51
Company policies	16	83	10	06	11	74
Compensation	66	30	-02	-05	15	55
Co-Workers	23	23	05	71	22	66
Creativity	10	11	81	23	-01	73
Independence	03	07	53	-20	53	60
Moral Values	-21	65	20	05	-14	53
Recognition	76	02	16	30	01	69
Responsibility	21	11	85	07	03	79
Security	41	20	-28	04	59	65
Social Service	-30	30	25	64	12	67
Social Status	54	-05	13	54	-07	61
Supervision-Human	18	73	03	21	08	62
Supervision-Technical	21	68	03	11	21	58
Variety	05	00	48	31	47	56
Working Conditions	29	44	07	22	40	51
EXTRACTION STATISTICS						
Eigenvalues	6.09	2.08	1.90	1.28	1.12	
Percentage of total variance	30.4	10.4	9.5	6.4	5.6	62.4

extracted and rotated, accounting for 62.4% of the total variance. The eigenvalues and percentage of variance accounted for by the unrotated factors are presented at the bottom of Table 14. The rotated factor loadings are presented in the top part of Table 14. The factors are described below in terms of their highest loadings and by comparison to previous studies.

Factor I is characterized by high positive loadings on Advancement, Recognition, Compensation, Authority, and Social Status. This is similar to the Status or Self Aggrandizement factor reported by Lofquist and Dawis(1978). Factor II is characterized by high positive loadings on Company Policies and Practices, Supervision-Human Relations, Supervision-Technical, and Moral Values. This factor is similar to the Safety factor reported by Lofquist and Dawis(1978). Factor III is characterized by high positive loadings on Responsibility, Creativity, Independence, and Ability Utilization. This is similar to the Autonomy factor reported by Lofquist and Dawis(1978). Factor IV is characterized by high positive loadings on Co-Workers, Social Service, and Social Status. This is similar to the Altruism factor reported by Lofquist and Dawis(1978)

Factor V is characterized by high positive loadings on Activity, Security, and Independence. and is similar to the Comfort factor reported by Lofquist and Dawis(1978).

Principal Components Analysis of WVI

Table 15 presents the correlation matrix of the 15 WVI scales. Table 16 presents the results of the principal components analysis for the WVI. Four factors were extracted and rotated, accounting for 64.1% of the total variance. The eigenvalues and percentage of variance accounted for by the unrotated factors are presented at the bottom of Table 16. The rotated factor loadings are presented in the top part of Table 16. The factors are described below in terms of their highest loadings and by comparison to previous studies.

Factor I is characterized by high positive loadings on Supervisory Relations, Way of Life, Surroundings, Security, Economic Returns, and Achievement. This is similar to the Material Factor reported by Super and Hendrix(1968) and by Super(1970); the Extrinsic Concern factor reported by Pryor(1980), and the Extrinsic Concern factor reported by Hesketh(1982). Factor II is characterized by high positive loadings on Creativity, Intellectual Stimulation, Independence, and Variety. This closely resembles the Self Expression Factor of the Super and Hendrix(1968) study as well as the Intellectual Concern factor reported by both Pryor(1980) and Hesketh(1982). Factor III is characterized by high positive loadings on Prestige, Management, Associates, and Esthetics. This is similar to the Power/Status Dimension reported by Hesketh(1982). Factor IV is characterized by high positive loadings on Altruism and high negative loadings on Economic Returns. This is similar

Table 15: Intercorrelation coefficients for Work Values Inventory

	Values	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Creativity														
2	Management	42													
3	Achievement	37	24												
4	Surroundings	21	31	38											
5	Supervisory Relations	21	26	50	47										
6	Way of Life	24	16	46	45	45									
7	Security	-02	22	34	44	42	29								
8	Associates	16	34	34	38	41	32	32							
9	Esthetics	55	35	29	29	18	24	16	25						
10	Prestige	26	49	44	38	37	26	41	55	34					
11	Independence	55	43	32	23	21	33	04	08	32	33				
12	Variety	50	29	33	18	30	26	07	26	28	30	42			
13	Economic Returns	08	25	29	43	46	35	57	25	11	44	26	20		
14	Altruism	33	21	25	20	17	27	-00	30	24	09	13	26	-17	
15	Intellectual Stimulation	58	31	35	13	15	24	-09	04	23	15	44	43	09	27

Table 16
Principal Components Analysis with Varimax Rotation
Work Values Inventory

	Rotated factor loadings				
VALUES	I	II	III	IV	h**2
Creativity	04	80	28	20	75
Management	07	38	70	-05	65
Achievement	62	36	12	17	56
Surroundings	66	09	30	06	53
Supervisory Relations	76	14	14	05	62
Way of Life	72	28	-07	20	64
Security	65	-19	35	-25	65
Associates	43	-11	61	35	70
Esthetics	06	39	54	20	49
Prestige	38	14	73	-11	70
Independence	14	76	20	-19	67
Variety	22	61	18	11	47
Economic Returns	64	10	23	-54	77
Altruism	16	21	13	82	76
Intellectual Stimulation	09	80	-05	11	66
EXTRACTION STATISTICS					
Eigenvalues	5.11	2.20	1.21	1.10	
Percentage of total variance	34.1	14.6	8.1	7.3	64.1

to the People Concern Factor reported by Pryor(1980).

Principal Components Analysis for the LRI-VS

The correlation matrix for the 20 LRI-VS variables is presented in Table 17. The results of the principal components analysis for the LRI-VS are presented in Table 18. Five factors were extracted and rotated accounting for 64.4% of the total variance. The eigenvalues and percentage of variance accounted for by the unrotated factors are presented at the bottom of Table 18. The rotated factor loadings are presented in the top part of Table 18. The factor are described below in terms of their highest loadings and by comparison to previous studies.

Factor I is characterized by high positive loadings on Achievement, Advancement, Prestige, Authority, Ability Utilization, and Economics. This factor is similar to the Success factor reported by De Lecea(1982); the Utilitarian Orientation factor reported by Sverko(1984); and the Achievement and Developement factor reported by Fitzsimmons, Macnab and, Casserly(1984). Factor II is characterized by high positive loadings on Life Style, Autonomy, Creativity, and Variety. This factor is similar to the Independence factor reported by Fitzsimmons, Macnab, and Casserly(1984) and the Independence Factor reported by De Lecea(1982). Factor III is characterized by high positive loadings on Altruism, Social Interaction, and Personal Development. This is similar to Social Orientation factor found by

Table 17: Intercorrelation coefficients for the Life Roles Inventory-Value Scales

Values	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 Ability Utilization																			
2 Achievement	61																		
3 Advancement	27	56																	
4 Aesthetics	33	36	16																
5 Altruism	28	17	-21	36															
6 Authority	35	48	45	24	20														
7 Autonomy	34	37	30	28	07	49													
8 Creativity	39	32	18	44	20	38	55												
9 Economics	24	36	65	06	-13	28	18	05											
10 Life Style	16	22	27	29	-05	23	60	36	26										
11 Personal Development	63	58	20	41	36	34	41	39	18	31									
12 Physical Activity	21	19	10	28	20	20	12	22	13	06	25								
13 Prestige	35	60	58	24	07	48	23	19	49	19	32	19							
14 Risk	14	17	23	30	02	24	28	35	08	30	07	25	15						
15 Social Interaction	17	17	-01	24	45	16	01	13	05	-01	24	31	19	18					
16 Social Relations	26	28	12	30	30	13	07	11	25	16	30	28	30	11	62				
17 Variety	33	25	20	37	19	24	39	40	17	39	32	34	21	41	35	35			
18 Work Conditions	29	29	24	28	11	22	14	12	45	17	26	12	30	-06	20	32	23		
19 Cultural Identity	22	22	17	19	13	19	15	11	34	16	18	15	25	02	23	38	23	49	
20 Physical Prowess	15	15	19	18	05	18	05	17	16	02	01	56	14	40	14	15	22	08	15

Table 18
Principal Components Analysis with Varimax Rotation
Life Roles Inventory - Value Scales

VALUES	Rotated factor loadings					
	I	II	III	IV	V	h**2
Ability Utilization	58	23	47	07	00	62
Achievement	80	17	27	11	04	76
Advancement	75	16	-35	18	16	77
Aesthetics	17	43	44	17	20	47
Altruism	-01	01	81	10	06	66
Authority	62	29	14	-00	16	52
Autonomy	31	79	05	-01	-04	73
Creativity	22	67	29	-10	17	61
Economics	58	04	-35	52	08	73
Life Style	09	81	-16	22	-05	72
Personal Development	48	34	57	10	-11	69
Physical Activity	13	04	25	12	72	61
Prestige	74	03	02	27	13	64
Risk	05	48	-07	-07	62	63
Social Interaction	-06	-03	54	48	33	63
Social Relations	06	03	38	68	21	65
Variety	03	57	20	33	35	59
Work Conditions	27	09	06	70	-10	58
Cultural Identity	13	10	04	72	02	55
Physical Prowess	15	-01	-03	03	83	72
EXTRACTION STATISTICS						
Eigenvalues	5.85	2.20	1.92	1.63	1.28	
Percentage of total variance	29.3	11.0	9.6	8.2	6.4	64.4

Fitzsimmons, Macnab and Casserly (1984). Factor IV is characterized by high positive loadings on Cultural Identity, Work Conditions, Social Relations, and Economics. This factor is similar to the Economic Conditions factor reported by Fitzsimmons, Macnab, and Casserly(1984). Factor V is characterized by high positive loadings on Physical Prowess, Physical Activity, and Risk. This is identical with the Physical Factor reported by Fitzsimmons, Macnab, and Casserly(1984), Fitzsimmons and Macnab(1980), and by Shears(1982).

Principal Components Analysis of WAPS

The correlation matrix for the 13 WAPS variables are presented in Table 19. The results of the principal components analysis for the WAPS are presented in Table 20. Four factors were extracted and rotated accounting for 64.0% of the total variance. The eigenvalues and percentage of variance accounted for by the unrotated factors are presented at the bottom of Table 20. The rotated factor loadings are presented in the top part of Table 20. The factors are described below in terms of their highest loadings and by comparison to previous studies. No factor analytic studies of the WAPS have been reported in the literature. Labeling the dimensions of this study uses the clustering reported by Pryor(1982).

Factor I is characterized by high positive loadings on Security, Prestige, Money, Co-Workers, Surroundings, and

Table 19: Intercorrelation coefficients for the Work Aspects Preference Scale

Preferences	1	2	3	4	5	6	7	8	9	10	11	12
1 Self Development												
2 Security	12											
3 Independence	32	06										
4 Creativity	53	03	37									
5 Altruism	35	03	18	37								
6 Management	20	32	20	33	22							
7 Money	03	52	23	02	-25	27						
8 Prestige	20	45	26	21	14	38	53					
9 Co-Workers	29	39	19	23	34	26	27	54				
10 Physical Activity	27	19	25	36	30	29	10	22	35			
11 Detachment	-07	22	23	-10	-04	08	32	21	19	13		
12 Life Style	07	31	33	08	10	14	24	23	22	20	45	
13 Surroundings	20	47	25	23	15	26	37	42	48	31	31	43

Table 20
Principal Components Analysis with Varimax Rotation
Work Aspects Preference Scale

PREFERENCES	Rotated factor loadings				
	I	II	III	IV	h**2
Self Development	12	68	-09	30	57
Security	78	-10	17	10	65
Independence	04	72	47	-08	75
Creativity	09	79	-09	28	72
Altruism	-05	26	-00	81	72
Management	52	38	-06	12	43
Money	76	11	24	-40	80
Prestige	77	20	11	09	65
Co-Workers	58	07	14	55	66
Physical Activity	21	32	19	50	43
Detachment	17	-10	79	-04	67
Life Style	15	08	80	14	69
Surroundings	54	10	43	29	58
EXTRACTION STATISTICS					
Eigenvalues	4.03	2.07	1.22	1.00	
Percentage of total variance	31.1	15.9	9.4	7.7	64.0

Management. This is a combination of the Privilege and Work Stability clusters reported by Pryor(1982). Factor II is characterized by high positive loadings on Creativity, Independence, Self Development. This factor has the same components as the cluster that Pryor(1982) labels Personal Freedom. Factor III is characterized by high positive loadings on Life Style and Detachment. This is similar to the cluster Pryor(1982) labels Work Commitment. Factor IV is characterized by high positive loadings on Altruism, Co-Workers,and Physical Activity. This is similar to the Selfless Effort cluster reported by Pryor(1982).

Comparison of the Principal Components Analyses

Table 21 presents an overview of the 4 principal components analyses described above. The factors for each instrument are described by the scales that have the highest factor loadings. They are presented in order of absolute magnitude. Negative loadings are designated with a (-). This overview simplifies the comparison of the content of factors across instruments and simplifies the understanding of the pairwise analyses of the factor structure of the four instruments which follows. It is evident from Table 21 that there are similarities in the content of the factors across the various instruments. For example, the LRI-VS Factor II (Independence), WVI Factor II (Self Expression), WAPS Factor II (Personal Freedom), MIQ Factor III (Autonomy) show similarities in the content of the scales loading highest on

Table 21: Overview of the variables with highest loadings for the LRI-VS, the WVI, the WAPS, and the MIQ

LRI-VS

I ACHIEVEMENT	II INDEPENDENCE	III SOCIAL ORIENTATION	IV ECONOMIC CONDITIONS	V PHYSICAL
Achievement	Life Style	Altruism	Cultural Identity	Physical Prowess
Advancement	Autonomy	Personal Development	Work Conditions	Physical Activity
Prestige	Creativity	Social Interaction	Economics	Risk
Authority				
Economics				
Ability Utilization				

WVI

I EXTRINSIC CONCERN	II SELF EXPRESSION	III POWER/STATUS	IV PEOPLE CONCERN
Supervisory Relations	Creativity	Prestige	Altruism
Way of Life	Intellectual Stimuln	Management	Economic Returns(-)
Surroundings	Independence	Associates	
Security	Variety	Esthetics	
Economic Returns			
Achievement			

WAPS

I PRIVILEDGE/WORK	II PERSONAL FREEDOM	III WORK COMMITMENT	IV SELFLESS EFFORT
Security	Creativity	Life Style	Altruism
Prestige	Independence	Detachment	Co-workers
Money	Self Development	Independence	Physical Activity
Co-Workers			
Surroundings			
Management			

MIQ

I STATUS	II SAFETY	III AUTONOMY	IV ALTRUISM	V COMFORT
Advancement	Company Policies	Responsibility	Co-Workers	Advancement
Recognition	Supervision Human	Creativity	Social Service	Security
Compensation	Supervision Technical	Independence	Social Status	Independence
Authority	Moral Values	Abilility Utilisation		
Social Status		Variety		

these factors. The factor scores were calculated for each instrument and pairwise canonical correlation analyses were carried out.

The correlations amongst the LRI-VS, WVI, WAPS, and the MIQ factor scores are presented in Table 22. The correlations significant at the .05 and .01 level are indicated in the table. Over half the correlations are significant at a .01 level (61 out of 121). Therefore, on the basis of examining the correlations between the 4 sets of factors it is reasonable to expect that there will be some underlying dimensions accounting for the relationships between each pair of factor sets.

The canonical analyses for the pairs of factor score sets are presented in Tables 23 through 28. These tables contain the canonical correlations and the canonical variate correlations. Table 23 presents the canonical correlations for the LRI-VS and the WVI. There were four significant canonical correlation of .83, .73, .69, and .24 respectively, indicating that there are four ways in which the LRI-VS and the WVI factors are related. The LRI-VS and the WAPS again have 4 significant canonical correlations (see Table 24). These are .83, .70, .67 and , .39 . The LRI-VS and the MIQ yielded three significant canonical correlations. These and related information are presented in Table 25. The first canonical correlation is .88, the second and third are .61 and .41. The other two canonical correlations are not significant. The analysis of the

Table 22: Intercorrelations LRI-VS, WVI, WAPS and MIQ factors

	LRI-VS Factors					WVI Factors				WAPS Factors			
LRI	1	2	3	4	5	1	2	3	4	1	2	3	4
1 Achievement													
2 Independence													
3 Social Orientation													
4 Economic Conditions													
5 Physical													
WVI													
1 Extrinsic	38	-03	04	50	03								
2 Self Expression	15	63	22	-19	06								
3 Power/Status	30	04	02	21	30								
4 People Concern	-27	-11	73	01	08								
WAPS													
1 Privilege/Work	56	-11	-24	36	21	50	-16	56	-30				
2 Personal Freedom	21	59	18	-18	10	-04	77	16	-03				
3 Work Commitment	-11	09	-12	39	-01	28	-04	03	-07				
4 Selfless Effort	-13	-11	68	17	24	17	04	14	76				
MIQ													
1 Status	44	00	-43	19	13	23	-06	32	-50	54	01	08	-37
2 Safety	-02	-01	22	20	06	30	05	-05	21	-01	-02	13	31
3 Autonomy	01	50	15	-23	-03	-20	56	-07	06	-26	54	-10	-01
4 Altruism	-01	-14	40	18	20	07	-06	31	51	15	-05	-02	48
5 Comfort	10	-09	-02	11	06	20	-13	-10	-03	20	14	09	11

Table 23
Canonical correlations and canonical variate correlations for the LRI-VS and the WVI

	LRI-VS	I	II	III	IV
1	Achievement	48	-55	02	-01
2	Independence	-12	-60	-66	-20
3	Social	-79	-39	40	-13
4	Economic	37	-31	62	-31
5	Physical	00	-29	13	92
	WVI				
1	Extrinsic	41	-50	52	-56
2	Self Exprsn.	-29	-71	-62	-16
3	Power/Status	24	-48	22	82
4	People Concern	-89	-14	54	02
	Rc	83*	73*	69*	24*
	Rc2	69	53	48	06

* $p<.001$

Table 24
Canonical correlations and canonical variate correlations for the LRI-VS and the WAPS

	LRI-VS	I	II	III	IV
1	Achievement	-48	09	-64	48
2	Independence	14	70	-42	-55
3	Social	81	-28	-38	13
4	Economic	-30	-61	-27	-66
5	Physical	04	-21	-44	12
	WVI				
1	Privl/Power	-69	-32	-61	21
2	Pers. Freedom	22	67	-67	-17
3	Work Commit.	-18	-21	-02	-96
4	Selfless Efft.	67	-62	-42	02
	Rc	83*	70*	67*	39*
	Rc2	70	49	45	15

* $p<.001$

Table 25
Canonical correlations and canonical variate correlations for the LRI-VS and the MIQ

	LRI-VS	I	II	III	IV	V
1	Achievement	-52	01	-55	28	59
2	Independence	20	71	-55	-33	-20
3	Social	80	-35	-35	11	33
4	Economic	-23	-55	-31	-74	-12
5	Physical	-08	-27	-42	51	-70
	MIQ					
1	Status	-84	03	-49	04	-21
2	Safety	17	-33	-35	-85	-05
3	Autonomy	36	68	-62	06	11
4	Altruism	32	-62	-47	51	-18
5	Comfort	-16	-21	-15	05	95
	Rc	74*	64*	41*	10	01
	Rc2	55	41	17	01	00

* $p<.001$

Table 26
Canonical correlations and canonical variate correlations for the WVI and the WAPS

	WVI	I	II	III	IV
1	Extrinsic	-44	55	04	-71
2	Self Exprsn.	47	09	86	-18
3	Power/Status	-38	55	29	68
4	People Concern	66	62	-41	04
	WAPS				
1	Priv/Work	-80	49	22	27
2	Pers. Freedom	33	15	93	-04
3	Work Commit.	-22	16	02	-96
4	Selfless Efft.	45	84	-29	03
	Rc	88*	77*	77*	18*
	Rc2	77	60	60	03

* $p<.001$

Table 27
Canonical correlations and canonical variate correlations for the MIQ and the WVI

	MIQ	I	II	III	IV
1	Status	-75	02	65	12
2	Safety	12	28	05	83
3	Autonomy	42	-69	45	26
4	Altruism	46	63	54	-22
5	Comfort	-15	20	-28	42
	WVI				
1	Extrinsic	-27	47	13	83
2	Self Exprsn.	37	-66	50	41
3	Power/Status	-16	33	85	-37
4	People Concern	87	49	-02	01
	Rc	77*	66*	44*	35*
	Rc2	59	44	19	12

* $p<.001$

Table 28
Canonical correlations and canonical variate correlations for the MIQ and the WAPS

	MIQ	I	II	III	IV
1	Status	-77	-28	-54	-06
2	Safety	16	40	-21	-81
3	Autonomy	57	-49	-62	-07
4	Altruism	12	65	-51	54
5	Comfort	-22	31	-14	-23
	WAPS				
1	Privl/Work	-77	20	-59	15
2	Pers. Freedom	42	-50	-74	-13
3	Work Commit.	-15	14	-01	-98
4	Selfless Efft.	46	83	-31	05
	Rc	77*	70*	40*	14
	Rc2	60	48	16	02

* $p<.001$

relationships between the WVI factors and the WAPS factors yielded four significant canonical correlations. These are presented in Table 26. The four canonical correlations were .88, .77, .77, and .18 suggesting four ways in which the WVI and the WAPS factors are related. Table 27 contains the information for the canonical analysis for the WVI and the MIQ. Four significant canonical correlations of .77, .66, .44, and .35 were found. The canonical correlations for the MIQ factors and the WAPS factors are shown, along with related information, in Table 28. Three significant canonical correlations were found. These had the values .77, .70, and .40.

The foregoing analyses suggest that the factor structures of the LRI-VS, WVI, WAPS, and the MIQ are highly related. The substantial nature of these relationships can be ascertained from the canonical variate correlations presented in tables 23 through 28. These relationships are summarized in Table 29. Table 29 presents the results of the canonical analyses for the pairwise comparison of factor structures. It is a simplification and summary of Tables 23 through 28. Only the factors which have the highest correlations with the canonical variates are shown in order of their magnitude. The plus (+) or minus (-) sign following the factor label indicates the sign of the correlation coefficient. Thus, for the comparison between the LRI and the WVI, the LRI-VS factor Social Orientation has the highest correlation for the LRI-VS factors, with the first

Table 29: Overview of Canonical variate correlates for 6 pairwise comparisons

LRI - WVI	I	II	III
LRI	Social Orientation(-) Achievement(+)	Independence (-) Achievement (-)	Independence (-) Economic (+) Social Orientation(+)
WVI	People Concern (-) Extrinsic (+)	Self Expression (-) Extrinsic (-) Power Status (-)	Self Expression (-) People Concern (+) Extrinsic (+)

LRI - WAPS	I	II	III	IV
LRI	Social Orientation(+) Achievement(-)	Independence (+) Economic(-)	Achievement (-) Physical (-) Independence(-)	Economic (-) Independence (-) Achievement (+)
WAPS	Privilege/Power(-) Selfless Effort(+)	Personal Freedom(+) Selfless Effort(-)	Personal Freedom(-) Privilege/Power(-) Selfless Effort (-)	Work Commitment (-)

LRI - MIQ	I	II	III
LRI	Social Orientation(+) Achievement(-)	Independence (+) Economic(-)	Independence(-) Achievement(-) Physical (-)
MIQ	Status (-)	Autonomy (+) Altruism(-)	Autonomy (-) Status (-) Altruism(-)

(continued on the next page)

Table 29 (continued)

WVI - WAPS		I	II	III
	WVI	People Concern (+) Self Expression (+) Extrinsic (-)	People Concern(+) Power Status(+) Extrinsic(+)	Self Expression (+) People Concern(-)
	WAPS	Priviledge/Work(-) Selfless Effort (+)	Selfless Effort (+) Priviledge/Work(+)	Personal Freedom (+)

MIQ - WVI		I	II	III	IV
	MIQ	Status (-) Altruism(+) Autonomy(+)	Autonomy (-) Altruism(+)	Status (+) Altruism (+) Autonomy (+)	Safety (+) Comfort (+)
	WVI	People Concern (+)	Self Expression (-) People Concern (+) Extrinsic (+)	Power/Status (+) Self Expression (+)	Extrinsic (+) Self Expression (+)

MIQ - WAPS		I	II	III
	MIQ	Status (-) Autonomy(+)	Autonomy (-) Altruism(+)	Autonomy (-) Status (-) Altruism (-)
	WAPS	Privilege/Work (-) Selfless Effort (+) Personal Freedom (+)	Altruism (+) Autonomy (-)	Personal Freedom (-) Privilege/Work (-)

canonical variate; the correlation is negative. Similarly, the WVI People Concern factor has the highest correlation for the WVI set of factors with the first canonical variate. The nature of the canonical variate, and thus, the nature of the relationship between the sets of factors can be ascertained from the factors presented in Table 29. Rather than describing each of the analysis separately, the following paragraphs describe some of the common findings across all analyses.

The factors which have the highest correlations with the first canonical variate in each of the analyses are factors which express the importance of the concern for others (Social Orientation, People Concern, Selfless Effort, and Altruism) at one end of the dimension and factors which express the importance of extrinsic rewards (Achievement, Extrinsic, Privilege/Work, Status) at the other end.

A second dimension which is highly similar throughout all of the analyses is a dimension which has factors related to the concern for autonomy or independence (Independence, Self Expression, and Autonomy) at one end of the dimension and factors which express concern for the importance of others (Social Orientation, People Concern, Selfless Effort, and Altruism). In some of the analyses this dimension also has extrinsic aspects attached to the 'others' pole.

A third dimension which seems to be common throughout the pairwise analyses is a more general dimension which has high correlations (which are in the same direction within an

analysis) on factors concerned with Autonomy/Independence, Extrinsic factors, and on Altruistic factors.

Summary

This study investigated the relationship and similarity of the four instruments at the level of factor structure. Principal components analysis yielded interpretable factors for each of the instruments. A comparison of the factors across instruments was made. This comparison suggested that there were three factors that showed similarities across all four scales; a factor emphasizing the importance of functioning creatively in an independent or autonomous fashion; a factor concerned with the importance of helping others; and a factor concerned with extrinsic rewards. In addition there were a number of factors specific to the instruments. Further information regarding the similarity of the factors across instruments was gathered from canonical analyses of all pairwise combinations of the scales. The canonical correlations between the sets of factors suggest that the factors from the different instruments are highly related.

C. Study 3: Concurrent Validity of the LRI-VS, WVI, WAPS, and MIQ

The purpose of this study was to investigate the existence and the nature of differences in values, needs and preferences amongst groups differing in occupational choice.

Specifically, it was expected that the concurrent validity of the four instruments would be demonstrated by showing that the instruments could discriminate significantly between students taking different courses.

Solution to the Problem

In order to examine the concurrent validity of the LRI-VS, WVI, WAPS, and the MIQ a number of distinct groups of post-secondary students had to be formed. The students in the main sample came from a number of areas. However, only three groups of students were large enough to be considered for this part of the study. These were a Business Administration Group, an Education group, and a Rehabilitation group. Further, from these groups only female students were used. There are a number of reasons for this. The main reason was that the proportions of males in the three groups differed radically from about 5% in the Rehabilitation group to about 25% for the Education group. This combined with the findings of a number of studies that there are male/female differences in values, needs, and preferences suggested that including the male students would lead to difficulties in interpretation and confounding of results.

The participants in this part of the study consisted of 317 female students: 105 Business students, 129 Education students and 83 Rehabilitation Medicine Students. The sample of 317 female students were further split into two samples

for the purposes of the present study. The first sample consisted of approximately 60% of the 317 students. They were assigned randomly to the first group which will be known as the estimation sample. The estimation sample was used for the estimation stage of the discriminant analysis to generate the discriminant functions. This sample consisted of 69 Business students, 85 Education students, and 55 Rehabilitation students. The classification equation based on this data was then applied to the remaining sample (cross-validation hold out) to test the efficacy of the classification equation. The classification sample consisted of 36 Business students, 44 Education students, and 28 Rehabilitation Medicine students.

To ensure the compatibility of results across the 4 analyses the same group of students was used in the estimation stage for each analysis. The estimation equations were then applied to the same separate hold out sample for each analysis.

The following statistical procedures were proposed. The overall hypothesis of no differences between mean centroids for the three groups was tested using multivariate analysis of variance (MANOVA). As a follow up to significant MANOVAs univariate F-tests were carried out for descriptive purposes.

The main follow up was a discriminant analysis which Huberty(1974) indicates is appropriate for four purposes: (1) separation between groups; (2) discrimination of

dimensions and variables; (3) estimation of the relationship between the variates and the discriminant functions and; (4) classifying individuals. The discriminant analysis can provide information concerning the minimum number of dimensions that underlie group differences on a set of variables (Bray and Maxwell,1982) and indicate how groups can be represented graphically in discriminant space(Overall and Klett, 1972; Tatsuoka, 1971; and Cooley and Lohnes, 1971).

All variables were entered into the analysis and the discriminant functions were based on all variables for a scale. The group centroids are presented as are the standardized discriminant weights, and the canonical structure matrix. The standardized discriminant coefficients or weights are the coefficients of the linear combinations derived to maximize group separation. The coefficients represent the relative contribution of the variable to the discriminant function. The canonical structure matrix (Klecka, 1980) will also be presented. This involves the calculation of the correlation of each individual variable with each discriminant function. This gives a measure of how well each of the variables independently relates to each of the discriminant functions. These correlations will be used to interpret the substantive nature of the discriminant functions (Bray and Maxwell, 1982).

Classification matrices were produced for both the estimation sample and the holdout sample for each of the

analyses. These classification or confusion matrices provide a convenient summary of the number correct and incorrect classifications made by the discriminant procedure, and give an index of the concurrent validity for the cross-validation hold out sample. The classification matrices were then analyzed by means of the Q statistic (Press, 1973, p383) which tests whether the discriminant procedure is significantly better than a purely random partitioning of the decision space.

Results: MIQ

Table 30 shows means, standard deviations, and univariate F-ratios for all 20 variables of the MIQ for the Business, Education, and Rehabilitation Medicine groups. The overall MANOVA test of significance shows that there were statistically significant differences amongst the mean vectors of the three groups at the .001 level, multivariate $F(40,374) = 5.39$. The univariate F-Tests (see Table 1) for Ability Utilization, Advancement, Company Policies and Practices, Creativity, Moral Values, Recognition, Responsibility, Security, and Social Service are all significant at p .01.

One significant discriminant function was generated; the eigenvalues, canonical correlations and other related information are presented in Table 31.

Table 32 presents the standardized discriminant coefficients and canonical variate correlations for both

Table 30
Means, standard deviations and univariate F-ratios for Business, Education, and Rehabilitation Medicine estimation sample: Minnesota Importance Questionnaire

Need	Business (n=69) Mean	S.D.	Education (n=85) Mean	S.D.	Rehab. (n=55) Mean	S.D.	F (2,206)
Ability Utilisation	1.32	0.69	1.59	0.54	1.61	0.50	4.93*
Achievement	1.60	0.69	1.70	0.55	1.65	0.56	0.57
Activity	0.23	0.76	0.00	0.71	0.09	0.60	2.30
Advancement	1.11	0.73	0.63	0.76	0.53	0.77	11.45*
Authority	-0.65	0.73	-0.53	0.76	-0.73	0.61	1.35
Company Policies	0.67	0.79	0.89	0.72	1.05	0.64	4.34**
Compensation	0.39	0.89	0.32	0.75	0.29	0.77	0.23
Co-Workers	0.71	0.85	0.71	0.59	0.78	0.56	0.24
Creativity	0.55	0.82	1.21	0.54	0.99	0.50	20.93*
Independence	-0.21	0.72	-0.05	0.79	-0.28	0.67	1.83
Moral Values	0.77	1.14	1.69	1.13	1.82	0.95	18.64*
Recognition	1.07	0.82	0.79	0.71	0.65	0.72	5.16*
Responsibility	0.62	0.70	1.16	0.62	0.86	0.61	13.54*
Security	1.23	1.00	0.67	0.81	0.78	0.79	8.73*
Social Service	0.53	1.03	1.31	0.76	1.67	0.78	29.14*
Social Status	-0.42	0.99	-0.39	0.77	-0.52	0.73	0.41
Supervision - Human	0.50	0.73	0.64	0.73	0.69	0.67	1.21
Supervision - Tech.	0.34	0.72	0.25	0.67	0.51	0.63	2.41
Variety	0.26	0.74	0.45	0.73	0.35	0.62	1.43
Working Conditions	0.62	0.84	0.72	0.61	0.71	0.68	0.45

* = $p<.01$
** = $p<.05$

TABLE 31
CANONICAL DISCRIMINANT FUNCTIONS MIQ

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION	AFTER FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
1*	1.15924	88.45	88.45	0.7327170	0	0.4022251	178.96	40	0.0000
2*	0.15141	11.55	100.00	0.3626283	1	0.8685007	27.704	19	0.0893

* MARKS THE 2 CANONICAL DISCRIMINANT FUNCTION(S) TO BE USED IN THE REMAINING ANALYSIS.

Table 32

Standardized discriminant function coefficients
Canonical variate correlations for the
Minnesota Importance Questionnaire

	STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS			CANONICAL VARIATE CORRELATIONS	
NEED	Func 1	Func 2		Func 1	Func 2
Ability Utilization	0.28	-0.38	1	0.20	-0.03
Achievement	-0.03	0.04	2	0.06	0.10
Activity	-0.22	-0.27	3	-0.13	-0.14
Advancement	-0.47	0.01	4	-0.31	0.13
Authority	0.01	0.23	5	0.03	0.29
Company Policies	0.33	-0.33	6	0.17	-0.22
Compensation	0.34	-0.01	7	-0.04	0.04
Co-Workers	-0.15	-0.06	8	0.02	-0.11
Creativity	0.40	0.19	9	0.40	0.37
Independence	-0.16	0.26	10	0.04	0.32
Moral Values	0.31	-0.02	11	0.39	-0.12
Recognition	-0.35	-0.02	12	-0.20	0.19
Responsibility	0.20	0.46	13	0.29	0.49
Security	-0.27	-0.06	14	-0.26	-0.15
Social Service	0.54	-0.44	15	0.47	-0.42
Social Status	0.07	0.09	16	-0.01	0.16
Supervision-Human	0.05	0.48	17	0.10	-0.06
Supervision-Tech.	-0.45	-0.52	18	0.00	-0.39
Variety	-0.02	0.20	19	0.09	0.16
Working Conditions	0.05	0.24	20	0.06	0.01

functions. Since only function one was considered significant the following discussion will pertain to that function. The standardized discriminant coefficients indicate that Social Service, Advancement, Supervision-Technical, and Creativity are important for group separation on Function 1, with Autonomy and Aesthetics contributing highly as well. Inspection of the canonical variate correlations indicates that Social Service, Creativity, and Moral Values, have the highest positive correlations with Function 1, and Advancement and Security have the highest negative correlations.

An inspection of the group centroids on Function 1 (see Figure 5) reveals that this dimension represents differences between Business students and the other two groups of students.

Classification

The discriminant functions derived from the MIQ analysis were then used to differentiate the respondents in the holdout (validation) sample on the basis of their need scores into Business, Education, and Rehabilitation Medicine groups. Table 33 summarizes the results of the classification analysis. Part 1 of Table 33 shows the percentage of correct and incorrect classifications based on the classification equation for the estimation sample. As the table indicates, 71% of the total estimation sample were correctly classified. When the function was applied to the raw data of the validation sample the the overall correct

Figure 5
Group centroids for the Business,
Education, and Rehabilitation Medicine Students
Minnesota Importance Questionnaire

Group Centroids

Group		Func 1
1	Business	-1.52
2	Education	0.74
3	Rehab. Med.	0.76

Table 33
Classification results for the estimation sample
and the validation holdout sample
Minnesota Importance Questionnaire

PART 1 ESTIMATION SAMPLE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP Business	Education	Rehab.
Business	69	58 84.1%	7 10.1%	4 5.8%
Education	85	8 9.4%	53 62.4%	24 28.2%
Rehabilitation Medicine	55	5 9.1%	12 21.8%	38 69.1%

PERCENT OF CASES CORRECTLY CLASSIFIED: 71.29%

PART 2 CROSS-VALIDATION HOLDOUT SAMPLE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP Business	Education	Rehab.
Business	36	24 66.7%	6 16.7%	6 16.7%
Education	44	5 11.4%	25 56.8%	14 31.8%
Rehabilitation Medicine	28	3 10.7%	6 21.4%	19 67.9%

PERCENT OF CASES CORRECTLY CLASSIFIED: 62.96%

classification was 63%, a drop of 8%.

The classification of the holdout sample is significant (Q=42.67, chi-square(1 d.f.)=10.83, p .001)when evaluated by the Q statistic.

Results: WVI

Table 34 shows means, standard deviations, and univariate F-ratios for all 15 variables of the WVI for the Business, Education, and Rehabilitation Medicine groups. The overall MANOVA test of significance shows that there were statistically significant differences amongst the mean vectors of the three groups at the .001 level, multivariate F(30,384)= 7.11. The univariate F-Tests (see Table 34) for Creativity, Management, Independence, Variety, Economic Returns, Altruism, and Intellectual Stimulation are all significant at p .01.

Two significant discriminant functions were generated. The eigenvalues, canonical correlations, and significance tests associated with the two functions are shown in Table 35.

Figure 6 presents the group centroids for the three groups on the two discriminant functions, and also presents a plot of the group centroids in discriminant space. The plot of the centroids illustrates that the first discriminant function orders the groups from Rehabilitation Medicine, to Education, to Business. The second discriminant function orders the groups from Education, to Business, to

Table 34
Means, standard deviations and univariate F-ratios for Business, Education, and Rehabilitation Medicine estimation sample: Work Values Inventory

Value	Business (n=69) Mean	S.D.	Education (n=85) Mean	S.D.	Rehab. (n=55) Mean	S.D.	F (2,206)
Creativity	9.43	2.88	11.41	1.95	11.73	2.15	18.86*
Management	8.23	2.46	9.29	1.97	8.65	2.23	4.52*
Achievement	12.42	2.00	12.65	1.62	12.91	1.80	1.13
Surroundings	10.92	2.53	11.26	2.31	11.09	2.30	0.37
Supervisory Relations	11.95	2.03	12.22	2.01	12.44	1.82	0.93
Way of Life	13.32	1.63	13.81	1.31	13.87	1.50	2.87
Security	11.50	2.47	10.58	2.48	10.23	2.78	4.31*
Associates	10.19	2.26	10.24	1.82	10.47	2.22	0.32
Esthetics	7.71	3.13	8.12	2.26	8.07	2.36	0.52
Prestige	10.75	1.98	10.75	2.01	10.24	2.77	1.09
Independence	10.28	2.00	12.12	1.64	10.80	2.12	19.27*
Variety	10.57	2.39	11.41	1.80	11.75	1.91	5.76*
Economic Returns	12.06	1.96	11.73	1.80	10.84	2.47	5.72*
Altruism	10.23	2.72	13.25	1.60	14.46	1.37	69.70*
Intellectual Stimul.	10.71	1.94	12.07	1.60	12.02	1.87	12.95*

*p<.001

TABLE 35
CANONICAL DISCRIMINANT FUNCTIONS WVI

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION	AFTER FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
					0	0.4135167	175.73	30	0.0
1*	1.00746	83.12	83.12	0.7084196	1	0.8301188	37.051	14	0.0007
2*	0.20465	16.88	100.00	0.4121665					

* MARKS THE 2 CANONICAL DISCRIMINANT FUNCTION(S) TO BE USED IN THE REMAINING ANALYSIS.

Table 36

Standardized Discriminant Function Coefficients
Canonical Variate Corelations for the WVI

	STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS		CANONICAL VARIATE CORRELATIONS	
	Func 1	Func 2	Func 1	Func 2
Creativity	0.29	-0.43	0.43	0.00
Management	0.08	0.22	0.16	0.31
Achievement	-0.24	-0.31	0.09	-0.10
Surroundings	0.03	0.08	0.05	0.08
Supervisory Relations	0.14	-0.07	0.09	-0.07
Way of Life	-0.07	-0.08	0.17	0.01
Security	-0.24	-0.04	-0.20	0.06
Associates	-0.12	-0.07	0.04	-0.09
Esthetics	-0.26	-0.00	0.07	0.04
Prestige	-0.10	-0.07	-0.05	0.19
Independence	0.24	1.08	0.29	0.71
Variety	0.04	-0.32	0.23	-0.08
Economic Returns	-0.08	0.29	-0.18	0.34
Altruism	0.89	-0.03	0.82	-0.18
Intellectual Stimulation	0.09	0.06	0.35	0.13

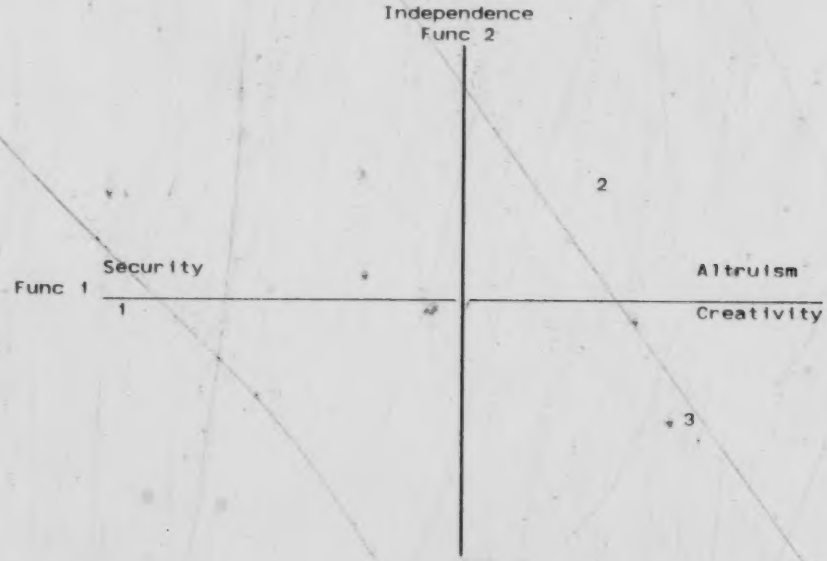
Rehabilitation. The standardized discriminant coefficients (Table 36) indicate that Altruism is most important for group separation on Function 1. On Function 2, Independence has the largest discriminant coefficient. Inspection of the canonical variate correlations indicates that Altruism, Creativity, and Intellectual Stimulation have the highest correlations with Function 1. Independence, Economic Returns, and Management have the highest correlations with Function 2.

Both of these indices suggest that the group separation on the first discriminant function is best defined by Altruism and Creativity and primarily represents the differences between Rehabilitation students and Business students. Group separation on the second discriminant function is best represented by Independence, Economic Returns, and Management and primarily represents differences between Rehabilitation Students and Education students.

Classification

The discriminant functions derived from the WVI analysis were then used to differentiate the respondents in the holdout (validation) sample on the basis of their Value scores into Business, Education, and Rehabilitation Medicine groups. Table 37 summarizes the results of the classification analysis. Part 1 of Table 37 shows the percentage of correct and incorrect classifications based on the classification equation for the estimation sample. Sixty eight percent of the total estimation sample were correctly

Figure 6
Group centroids for the Business,
Education, and Rehabilitation Medicine Students
Work Values Inventory



Group Centroids

	Group	Func 1	Func 2
1	Business	-1.41	-0.08
2	Education	0.57	0.48
3	Rehab. Med.	0.89	-0.64

Table 37
Classification results for the estimation group
and validation holdout sample
Work Values Inventory

PART 1 ESTIMATION SAMPLE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP Business	Education	Rehab.
Business	69	52 75.4%	6 8.7%	11 15.9%
Education	85	11 12.9%	57 67.1%	17 20.0%
Rehabilitation Medicine	55	3 5.5%	18 32.7%	34 61.8%

PERCENT OF CASES CORRECTLY CLASSIFIED: 68.42%

PART 2 CROSS VALIDATION HOLDOUT SAMPLEIS -

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP Business	Education	Rehab.
Business	36	23 63.9%	5 13.9%	8 22.2%
Education	44	11 25.0%	22 50.0%	11 25.0%
Rehabilitation Medicine	28	4 14.3%	7 25.0%	17 60.7%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 57.41%

classified. When the function was applied to the raw data of the validation sample the concurrent validity on the holdout cases dropped to 57%. The classification of the holdout sample is significant (Q=21.41, chi-square(1 d.f.)=10.83, p .001)when evaluated by the Q statistic.

Results: LRI-VS

Table 38 shows means, standard deviations, and univariate F-ratios for all 20 variables of the LRI-VS for the three post-secondary student groups. The overall MANOVA test of significance shows that there were significant differences amongst the mean vectors of the three groups at the .001 level, multivariate F(40,374)= 6.95. The univariate F-Tests (see Table 38) for Advancement, Altruism, Autonomy, Creativity, Economics, Life Style, Physical Activity, Social Interaction, Variety, and Physical Prowess are all significant at p .01.

Two significant discriminant functions were generated. Information relating to these two functions is presented in Table 39.

The location of the three post-secondary student groups on these two discriminant functions gives some idea as to the amount and direction of separation between the groups. Figure 7 presents the group centroids for the two discriminant functions both numerically and graphically. The graph clearly shows that the first discriminant function separates the three groups, ranking them from high to low in

Table 38
Means, standard deviations and univariate F-ratios for Business, Education, and Rehabilitation Medicine estimation sample: Life Roles Inventory - Value Scales

Value	Business (n=69) Mean	S.D.	Education (n=85) Mean	S.D.	Rehab. (n=55) Mean	S.D.	F (2,206)
Ability Utilisation	17.06	2.13	17.50	1.83	17.61	2.12	1.39
Achievement	17.17	1.94	17.02	2.04	17.14	2.23	0.12
Advancement	15.42	2.55	13.83	3.05	13.10	3.56	9.76*
Aesthetics	13.85	3.10	14.78	3.15	13.87	3.28	2.12
Altruism	14.15	3.17	17.76	2.04	18.24	2.24	53.41*
Authority	13.50	2.85	14.38	2.52	13.83	2.69	2.14
Autonomy	15.47	2.58	17.04	2.01	15.45	2.40	11.83*
Creativity	13.16	3.47	15.14	2.72	14.72	3.27	8.06*
Economics	16.27	2.86	15.03	2.86	14.57	3.59	5.42*
Life Style	14.36	2.48	15.06	2.07	13.70	2.79	5.45*
Personal Development	17.71	1.88	18.35	1.43	18.36	1.71	3.49**
Physical Activity	14.59	3.26	14.46	3.35	16.24	2.57	6.17*
Prestige	15.81	2.59	15.13	2.65	15.03	3.18	1.56
Risk	9.70	2.97	9.98	2.79	9.49	3.02	0.50
Social Interaction	13.68	3.00	14.39	2.70	15.22	2.27	4.95*
Social Relations	17.10	2.34	17.14	2.09	17.14	1.91	0.01
Variety	13.27	3.10	14.86	2.69	14.38	2.61	6.15*
Working Conditions	14.29	3.10	13.82	2.86	13.97	3.28	0.46
Cultural Identity	12.99	3.02	13.59	2.91	12.60	3.15	1.91
Physical Prowess	9.27	3.45	7.56	2.53	10.67	3.55	16.93*

* = $p < .001$
** = $p < .05$

TABLE 39

CANONICAL DISCRIMINANT FUNCTIONS LRI-VS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION	AFTER FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
					0	0.3291176	218.38	40	0.0000
1*	0.97820	64.60	64.60	0.7031998	1	0.6510605	84.329	19	0.0000
2*	0.53596	35.40	100.00	0.5907110					

Table 40

Standardized Discriminant Function coefficients
Canonical Variate Correlations for the LRI-VS

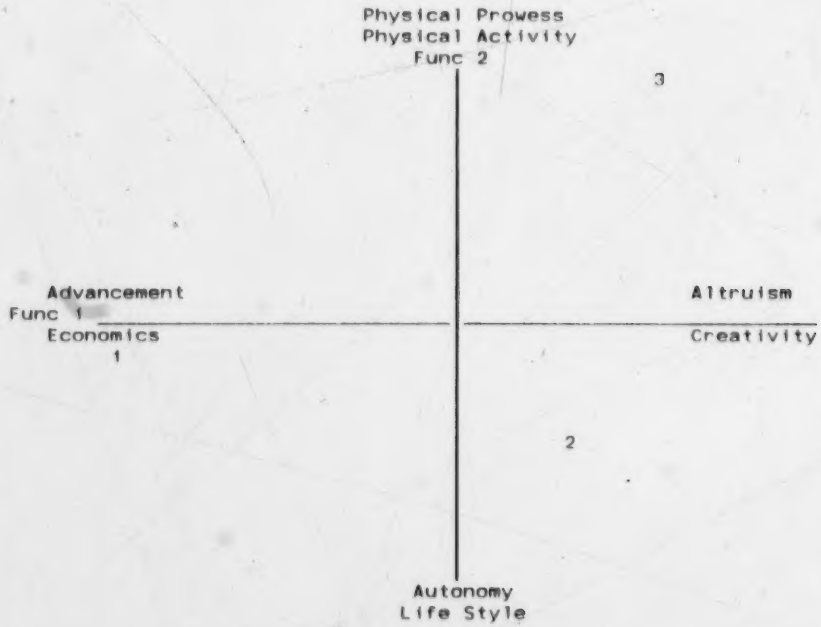
	STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS		CANONICAL VARIATE CORRELATIONS	
	Func 1	Func 2	Func 1	Func 2
Ability Utilization	-0.24	-0.05	0.11	0.05
Achievement	-0.02	0.33	-0.03	0.03
Advancement	-0.39	-0.22	-0.28	-0.19
Aesthetics	-0.30	-0.39	0.10	-0.14
Altruism	0.93	0.22	0.70	0.26
Authority	0.07	-0.10	0.13	-0.08
Autonomy	0.27	-0.64	0.24	-0.33
Creativity	0.28	0.13	0.28	-0.01
Economics	-0.03	-0.13	-0.21	-0.13
Life Style	0.09	0.12	0.07	-0.30
Personal Development	-0.01	0.26	0.18	0.04
Physical Activity	-0.06	0.07	0.05	0.33
Prestige	-0.12	0.18	-0.12	-0.05
Risk	-0.05	-0.38	0.03	-0.09
Social Interaction	-0.22	0.35	0.16	0.21
Social Relations	-0.02	-0.35	0.01	0.00
Variety	0.45	0.05	0.25	-0.04
Working Conditions	-0.16	0.19	-0.07	0.01
Cultural Identity	0.12	-0.33	0.05	-0.17
Physical Prowess	-0.25	0.87	-0.14	0.52

the order (1)Rehabilitation Medicine, (2)Education and (3)Business. The second discriminant function also separates the groups distinctly, ranking them from high to low in the order (1)Rehabilitation Medicine, (2)Business, and (3)Education. Thus, the primary dimension of separation among occupational choice groups represents the difference between Rehabilitation Medicine students and Business students. The secondary dimension of group differences separates Education students from Rehabilitation Medicine students.

Bearing the configuration of group centroids in mind, the standardized dicriminant coefficients and the canonical variate correlations can be examined to see if any substantive interpretation of the two discriminant functions can be given. Table 40 presents both the standardized discriminant function coefficients and the canonical variate correlations for the 20 scales of the LRI-VS.

The standardized discriminant coefficients indicate that Altruism, Variety, and Advancement are most important for group separation on Function 1. On Function 2, Physical Prowess has the largest discriminant coefficient with Autonomy, and Aesthetics contributing highly as well. Inspection of the canonical variate correlations indicates that Altruism, Creativity, Advancement, Variety, and Economics have the highest correlations with Function 1. Physical Prowess has the highest correlation with Function 2 followed by Autonomy and Physical Activity. Thus, the first

Figure 7
Group centroids for the Business,
Education, and Rehabilitation Medicine Students
Life Roles Inventory - Value Scales



Group Centroids

	Group	Func 1	Func 2
1	Business	-1.38	-0.17
2	Education	0.44	-0.62
3	Rehab. Med.	0.84	1.17

dimension represents differences that are best defined by Altruism at the positive end of the dimension and by Advancement at the opposite end. The second dimension represents differences that are best defined by Physical Prowess and Physical Activity at the positive end of the dimension and by Autonomy and Life Style at the negative end.

Classification

The discriminant functions derived from the LRI-VS analysis were then used to differentiate the respondents in the holdout (validation) sample on the basis of their Value scores into Business, Education, and Rehabilitation Medicine groups. Table 41 summarizes the results of the classification analysis and shows the percentage of correct and incorrect classifications based on the classification equation. As Table 41 indicates, 74% of the total estimation sample were correctly classified. When the function was applied to the raw data of the validation sample the overall correct classification was 67%, a drop of 7%.

The classification of the holdout sample is significant (Q=54.00, chi-square(1 d.f.)=10.83, p .001)

Results: WAPS

Table 42 shows means, standard deviations, and univariate F-ratios for all 13 variables of the WAPS for the three post-secondary student groups. The overall MANOVA test of significance shows that there were statistically significant

Table 41
Classification results for estimation group
and Cross-validation hold-out group
LRI - VS

PART 1 ESTIMATION SAMPLE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP Business	Education	Rehab.
Business	69	54 78.3%	7 10.1%	8 11.6%
Education	85	11 12.9%	62 72.9%	12 14.1%
Rehabilitation Medicine	55	7 12.7%	9 16.4%	39 70.9%

PERCENT OF CASES CORRECTLY CLASSIFIED: 74.16%

PART 2 CROSS-VALIDATION HOLDOUT SAMPLE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP Business	Education	Rehab. 3
Business	36	28 77.8%	3 8.3%	5 13.9%
Education	44	6 13.6%	26 59.1%	12 27.3%
Rehabilitation Medicine	28	2 7.1%	8 28.6%	18 64.3%

PERCENT OF CASES CORRECTLY CLASSIFIED: 66.67%

Table 42
Means, standard deviations and univariate F-ratios for Business, Education, and Rehabilitation Medicine estimation sample: Work Aspects Preference Scale

Aspect	Business (n=69) Mean	S.D.	Education (n=85) Mean	S.D.	Rehab. (n=55) Mean	S.D.	F (2,206)
Self Development	15.17	3.15	16.62	2.02	17.13	2.11	10.97*
Security	15.52	3.66	14.04	3.45	14.18	3.43	3.83**
Independence	11.70	2.63	14.31	2.61	12.38	2.28	21.99*
Creativity	11.41	3.54	13.74	3.01	14.11	3.21	13.69*
Altruism	11.65	3.48	16.00	2.46	17.42	2.02	78.22*
Management	9.94	2.99	10.72	3.17	9.96	2.95	1.59
Money	13.59	3.15	12.05	2.65	11.20	3.20	10.64*
Prestige	13.62	2.77	13.61	2.77	13.11	3.43	0.60
Co-Workers	14.33	3.34	14.27	2.59	14.78	2.86	0.56
Physical Activity	12.13	3.46	13.01	2.98	14.67	2.21	11.34*
Detachment	11.77	3.49	10.08	3.60	11.11	3.39	1.47
Life Style	13.07	3.48	13.24	3.50	13.40	2.73	0.15
Surroundings	13.83	3.05	13.47	2.86	13.16	2.58	0.84

* = $p<.001$
** = $p<.05$

differences amongst the mean vectors of the three groups at the .001 level, multivariate F(26,388)= 9.79. The univariate F-Tests (see Table 42) for Self Development, Independence, Creativity, Altruism, Money, and Physical Activity are all significant at p .001.

Two significant discriminant functions were generated; the eigenvalues, canonical correlations, and related information are presented in Table 43.

Figure 8 presents the group centroids for the three groups on the two discriminant functions and a plot of the group centroids in discriminant space. The plot of the centroids illustrates that the first discriminant function orders the groups from Rehabilitation Medicine, to Education, to Business. The second discriminant function orders the groups from Rehabilitation Medicine, to Business, to Education. The standardized discriminant coefficients indicate that Altruism, Security, and Independence are important for group separation on Function 1. On Function 2, Independence has the largest discriminant coefficient with Physical Activity and Management contributing highly as well.

Inspection of the canonical variate correlations indicates that Altruism, Creativity, Self Development, and Money have the highest correlations with Function 1. Independence has the highest correlation with Function 2 followed by Physical Activity (Table 44).

Classification

TABLE 43
CANONICAL DISCRIMINANT FUNCTIONS WAPS

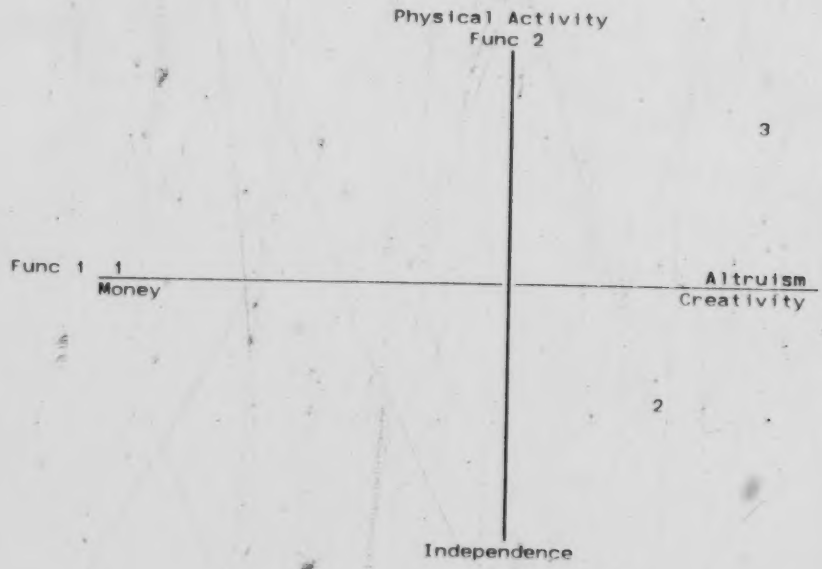
FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION	AFTER FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
					0	0.3645480	201.82	26	0.0
1*	1.13487	79.93	79.93	0.7291006	1	0.7782631	50.138	12	0.0000
2*	0.28491	20.07	100.00	0.4708895					

* MARKS THE 2 CANONICAL DISCRIMINANT FUNCTION(S) TO BE USED IN THE REMAINING ANALYSIS.

Table 44
Standardized Discriminant Function Coefficients
Canonical Variate Correlations for the WAPS

	STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS		CANONICAL VARIATE CORRELATIONS	
Aspect	Func 1	Func 2	Func 1	Func 2
Self Development	0.07	0.26	0.30	0.08
Security	-0.32	0.15	-0.18	0.08
Independence	0.31	-1.04	0.28	-0.65
Creativity	-0.04	0.14	0.34	-0.00
Altruism	0.93	0.15	0.81	0.19
Management	-0.06	-0.36	0.06	0.20
Money	-0.09	0.08	-0.29	-0.14
Prestige	0.01	0.01	0.04	0.12
Co-Workers	-0.27	-0.07	0.03	-0.13
Physical Activity	0.20	0.50	0.25	0.36
Detachment	-0.16	0.20	-0.10	0.09
Life Style	0.07	0.25	0.03	0.03
Surroundings	-0.06	-0.11	-0.09	-0.06

Figure 8
Group centroids for the Business, Education, and Rehabilitation Medicine Students Work Aspects Preference Scale



Group Centroids

Group		Func 1	Func 2
1	Business	-1.49	0.10
2	Education	0.60	-0.56
3	Rehab. Med.	0.94	0.75

The discriminant functions derived from the WAPS analysis were then used to differentiate the respondents in the holdout (validation) sample on the basis of their preference scores into Business, Education, and Rehabilitation Medicine groups. Table 45 summarizes the results of the classification analysis. Part 1 of Table 45 shows the percentage of correct and incorrect classifications based on the classification equation. As Table 45 indicates, 75% of the total estimation sample were correctly classified. When the function was applied to the raw data of the validation sample the the overall correct classification was 64%, a drop of 11%. The classification of the holdout sample is significant (Q=45.37, chi-square(1 d.f.)=10.83, p .001).

Summary

This study investigated the concurrent validity of the four instruments. The results indicate each of the instruments discriminates between groups of students who differ in their course of study. The nature of the dimensions along which they are discriminated are similar across all four instruments.

Table 45
Classification results for estimation group
and validation holdout group
Work Aspects Preference Scale

PART 1 ESTIMATION SAMPLE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP Business	Education	Rehab.
Business	69	54 78.3%	5 7.2%	10 14.5%
Education	85	12 14.1%	59 69.4%	14 16.5%
Rehabilitation Medicine	55	0 0.0%	12 21.8%	43 78.2%

PERCENT OF CASES CORRECTLY CLASSIFIED: 74.64%

PART 2 CROSS-VALIDATION HOLDOUT SAMPLE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP Business	Education	Rehab. 3
Business	36	27 75.0%	6 16.7%	3 8.3%
Education	44	7 15.9%	24 54.5%	13 29.5%
Rehabilitation Medicine	28	4 14.3%	6 21.4%	18 64.3%

PERCENT OF CASES CORRECTLY CLASSIFIED: 63.89%

V. Discussion

Although a variety of different approaches to the study and measurement of values, needs, and preferences have been employed, there is little research that makes it possible to systematically compare the results obtained from alternative measures or methods. These omissions provided the impetus for this study. The present set of studies presents an initial attempt at providing an operational and empirical integration of work related needs, values, and preferences.

The introductory chapters suggested that the concept of needs, values, and preferences are muddled, unless one keeps track of the level of generality or specificity being referred to by these terms, and by keeping track of who is doing the referring. The concepts of values and needs are especially burdened by excess meaning and can mean different things in different theories. The literature review suggests that needs as measured by the Minnesota Importance Questionnaire (Lofquist and Dawis, 1968); values as measured by the Work Values Inventory (Super, 1970) and the Life Roles Inventory - Value Scales (Work Importance Study, 1984); and preferences as measured by the Work Aspects Preference Scale (Pryor, 1981) are similar in a number of ways. They deal with the same area of vocational behaviour, they operate at the same level of generality, they are each concerned with what individuals think is important about their work or life, and they each use characteristics of the social and/or work environment to generate traits or scales.

The three studies reported here examined the similarities amongst the four instruments in a number of different ways.

The relationship between values, needs, and preferences

In study 1 the convergent and discriminant validity of the eight matched traits across the LRI-VS, the WVI, the WAPS, and the MIQ were investigated. The eight scales common to the LRI-VS, WVI, WAPS, and MIQ show very high validities when judged against the criteria of Campbell and Fiske's(1959) procedure. The convergent validities of all 8 scales are statistically significant as specified. In addition, the results satisfy all three discriminant validity criteria proposed by Campbell and Fiske(1959). Thus, the traditional Campbell and Fiske MTMM analysis suggested that the criteria for convergent and discriminant validity have been met. As previously discussed, the Campbell and Fiske criteria have severe limitations. The approach does, however, provide an important initial assessment of convergent and discriminant validity.

The confirmatory factor analysis approach provides a more rigorous test of the trait and method variance within the MTMM matrix. Evidence for the existence of trait or method factors is based on the accumulation of evidence from factor loadings in the LAMBDA X matrix of the General Model, the variance components based upon the factor loadings, and the relative goodness-of-fit of alternative models. The analysis of the General Model, which hypothesized 4

correlated method factors and 8 correlated trait factors, provides confirmation of the results inferred from the Campbell and Fiske analysis. The trait loadings were generally high. The trait having the lowest set of loadings was trait 4, the Independence/Autonomy trait. The partitioning of variance due to method, trait, and error for the General Model indicate that the trait factors account for approximately 50% of the variance, which is twice as much as that accounted for by the method factors. The different instruments produced different amounts of trait and method variance. The WVI showed the highest method and trait variance, the MIQ showed the lowest trait variance, but its trait variance was substantially higher than its method variance. A number of alternative models were tested, the results of which further attest to the importance of trait factors in fitting the models to the data. Attempting to fit models consisting of only method factors, or of one general factor with loadings on all 32 variables (eight for each method) led consistently to a poorer fit to the data, than attempts to fit models that specified 8 trait factors. Inspection of the differences between the observed and predicted correlations indicate that all models which include 8 correlated trait factors produce a very good fit to the data.

The elimination of correlations amongst traits produces a significantly poorer fit to the data. This suggests that the traits are truly correlated. Schmidt(1978) argued that

discriminant validity can be evaluated by inspecting the correlations amongst the factors in the PHI matrix (Table 10); with significant correlations indicating the lack of discriminant validity. In direct contradiction to this suggestion it can be argued that significant correlations in the PHI matrix can be taken as evidence for the third discriminant validity criterion (pattern of correlations amongst traits is similar for each method). As with the interpretation of any oblique factor solution it is only when correlations approach unity and are inconsistent with underlying theory that one needs to be concerned about the lack of discriminant validity. The correlations between the trait factors for the General Model(Table 10) are low to moderate. The pattern of the trait factor correlations is not inconsistent with previous research on the structure of the four instruments. For example, Security/Economics correlate at .49 with Work Conditions/Surroundings and .44 with Prestige. This is indicative of the extrinsic factors found in a number of studies. Similarly, the correlation between Independence/Autonomy and Creativity is not unexpected.

Discriminant validity is further demonstrated by the significantly poorer fit to the data when traits factors are combined. The trait factors Creativity and Independence/Autonomy were combined but led to a poorer fit to the data. The Tucker-Lewis coefficient for this model was almost as high as the General Model but the mean of the

residual correlation matrix was three times higher. This provides further support for the validity of each rating dimension.

The general conclusion is that, although the four instruments differ to some extent, the results of the convergent and discriminant validity analyses strongly indicated that for the eight matched traits the Minnesota Importance Questionnaire, the Work Values Inventory, the Life Roles Inventory - Value Scales, and the Work Aspects Preference Scale were measuring highly similar constructs.

Relationship between the structures of the MIQ, the WVI, the LRI-VS, and the WAPS

The second study, like the first, attempted to look at the similarities amongst the four instruments. This study looked at the next level of generality, that of factor structure. The principal components analysis of each scale resulted in factors which were interpretable in light of previous research. The number of factors found were not inconsistent with previous research. Comparing the results of the analyses provides some insight into the nature of the factors that appear common across instruments and those that are unique to an instrument. The LRI-VS Independence factor, the Self Expression factor from the WVI, the Personal Freedom Factor from the WAPS, and the Autonomy factor from the MIQ appear to be similar in content. This factor emphasizes the importance of functioning creatively in an

independent or autonomous manner or environment.

Another factor which appears to be common across all four instruments is a factor concerned with the importance of Altruism or social service - the importance of helping others. In some of the analyses this takes on the form of a bipolar dimension with Altruism at one end and Economic Returns at the other end (WVI - People Concern factor). In the other instruments it takes on a more social aspect with loadings on Co-Workers or Social Interaction (LRI-VS - Social Orientation; WAPS-Selfless Effort; MIQ-Altruism) thus suggesting the importance of helping others and being with others.

A third factor which appears in all four analyses in one form or another is a factor concerned with extrinsic rewards. The content of this factor is concerned with the importance of being able to advance quickly in a career, obtaining social status and recognition, and receiving adequate compensation, and having authority. The factors which best represent this are the LRI-VS Achievement factor, the WVI Power/Status Factor, the WAPS Privileged Work factor, and two factors from the MIQ - the Status factor and the Comfort factor.

Another factor which is frequently found in the analyses is a factor that is concerned with aspects of the work environment. Thus, the LRI-VS Economic Conditions factor is concerned with the importance of an environment which has good working conditions and allows one to retain

one's cultural identity. In the WVI analysis the Extrinsic concern factor is concerned with having a pleasant environment for both work non-work and where supervisors are easy to get along with. Although this set of factor show similaries in their concern for the importance of the work or living environment they do emphasize different components of this concern.

A number of factors do appear to be unique to the instruments. One factor which seems completely unique to an instrument is the LRI-VS Physical factor which emphasizes the importance of the physical aspects of work. Similarly, the WAPS Work Commitment factor involves a concern for the general effects that work may have on one's life outside of the work environment, and does not have an equivalent in any other analyses. The MIQ Safety factor appears to have no equivalent in the factors from the other three instruments. This factor is concerned with the importance of good company relations in terms of policy and supervision.

Further information about the similarities between the factor structures was gathered from the pairwise canonical correlations of the sets of factors derived from the principal components analyses. In general, all of the analyses showed that the pairs of instruments were highly correlated with the first canonical correlation ranging between .74 and .88. Taking this first canonical correlation as an indicator of the degree of overall relationship between pairs of factor solutions we can then rank order the

instruments in terms of the closeness of the relationship to each other. The factors of the WVI and the WAPS had the highest canonical correlation (.88), followed by the correlation between the LRI and the WVI and the LRI and the WAPS (.83). The canonical correlation between the MIQ and the WVI and the MIQ and the WAPS were next (.77). The lowest canonical correlation was between the MIQ and the LRI (.74). The nature of these canonical correlations was outlined in the results section and this suggested that there were three dimensions across the canonical analyses which explained the similarities between the scales: Concern for others versus a concern for extrinsic rewards; Concern for autonomy versus a concern for others; and a general dimension with high correlations on autonomy, extrinsic, and altruistic factors.

It would seem that the size of the canonical correlations between the sets of factors from the four instruments indicate a high relationship between the factor structures of the LRI-VS, the WVI, the WAPS, and the MIQ. These findings suggest that the factor structures are very similar and the nature of these similarities are quite constant across all pairs of instruments.

Taken together the above two studies indicate that the MIQ, the WVI, the LRI-VS, and the WAPS are measuring highly similar constructs. This similarity is high, not only at a scale level, but at the level of the factors underlying the instruments.

Concurrent Validity

The third study also compared the four instruments but in a different way. The third study looked at the ability of the MIQ, the WVI, the LRI-VS, and the WAPS to discriminate between groups.

The multivariate null hypotheses that there were no differences among the group centroids of a group of Business students, a group of Education students, and a group of Rehabilitation students for the (1)the LRI-VS scales; (2)WVI scales; (3)WAPS scales; (4)MIQ were rejected.

In addition to the multivariate significance tests, the concurrent validity of the 4 scales was assessed by their ability to classify students into the "correct" group based on the classification equations derived from each analysis. The LRI-VS showed the highest correct classification rate (67%), for the cross-validation holdout sample, followed by the WAPS (64%), the MIQ(63%), and the WVI(57%). The LRI-VS also showed the least shrinkage between the correct classification rates from the estimation sample to the cross-validation sample (7%), followed by the MIQ(8%), the WVI(11%) and the WAPS(11%). Thus, all 4 instruments show acceptable levels of concurrent validity in their classification of a cross-validation holdout sample into Business, Education, and Rehabilitation Medicine groups.

Several conclusions can be drawn about the nature of these differences between the groups by examining the statistically significant discriminant functions. There are

a number of underlying dimensions which account for the differences between the three groups for each instrument. The first discriminant function for all four instruments has, as its highest correlate, a variable that expresses the importance of the concern for others: LRI-VS(Altruism), WVI(Altruism), WAPS(Altruism), and the MIQ(Social Service). In addition, the next highest positive correlation was found for Creativity on all instruments. The negative correlations for each of the scales suggest the importance of Advancement and Security. This dimension is essentially a concern for others Vs. the concern for Advancement and Security. The separation on this function is essentially between the Business group and the Rehabilitation Medicine group. The position of the groups on the primary discriminant function seem to be consistent with previous research.

The secondary dimensions of the LRI-VS, the WVI, and the WAPS also show some similarities. The variables having the largest correlations with the second discriminant function for the LRI-VS indicate that the function is concerned with the importance of the Physical Vs. the importance of Autonomy and Life Style. A similar interpretation of the second discriminant function for the WAPS is also indicated. The WVI the variable with the highest correlation is Independence. This variable will be used to label this dimension. This function generally separates the Rehabilitation Medicine group from the Education group; with the Education group having centroids

that indicate they consider Independence or Autonomy more important than do Rehabilitation students. On the other hand the Rehabilitation students consider the physical aspects of work more important than do the Education students.

In conclusion, the four instruments discriminate between groups of post-secondary students who differ in courses of study. The nature of the dimensions along which the groups differ is fairly constant across the four instruments.

Conclusions

The purpose of the thesis was to provide an empirical integration of the constructs of values, needs, and preferences. These three constructs have found wide usage in the literature and are important for both vocational counselling and occupational psychology. The present set of studies did not attempt to look at the constructs within their own theoretical system and thus can make no statements about the adequacy of them in this respect. The studies do provide an important initial attempt at integrating these constructs outside of their theoretical systems and provide practicioners and researchers with some information about the differences and communalities amongst the constructs which has been until now, completely lacking. Thus, the operationalizations of the constructs were compared in the introductory segment and this suggested that the constructs were highly similar. In an attempt to define the boundaries

of the constructs empirically a number of studies were carried out which looked at the relationships between the four instruments.

The first study which looked at the relationship of the instruments at a scale level provided evidence that the instruments contain scales that measure highly similar traits. At the level of factor structure the second study examined the similarities and the relationship between the factors found for each of the four instruments. Again there was a highly significant relationship between the sets of factors for each instrument. The instruments also had a number of factors in common which suggest that there are factors which can be generalized across the method of assessment. This is a particularly important finding since it suggests that there is some constancy in rating of the importance of work and social environments which is independent of the method used. Thus, all four instruments have factors which are first concerned with the importance of functioning creatively in an independent manner, secondly, concerned with the importance of helping others, and thirdly, concerned with importance of extrinsic rewards. These two studies are important in that they help reconcile possible confusions in previous research and practice. The demonstration of common underlying structures across instruments provides a new basis for comparison of the different inventories which may make the results of previous research more understandable. Since much of the research on

comparing instruments has been motivated by counsellors who were frustrated and confused by the plethora of constructs (Cole and Hanson, 1971), consideration of the relevance of these findings for counselling practice is appropriate. The results of the study do have implications for the interpretation of scores for a single inventory as well as for comparing scores from more than one inventory. The first study indicates that if a person has a high score on for example an Altruism scale on one instrument he or she is likely to have a high score on Altruism on another instrument. The structural similarities of the instruments suggest further that if counsellors are considering patterns of scales rather than individual scales it is likely that the patterns can be generalized across instruments. The concurrent validity study provides evidence as to the importance of the constructs for use in counselling. The classification rates for all instruments suggest that they would be useful tools in counselling practice. The classification rates and the level of concurrent validity across the four instruments is highly similar. In addition the nature of the dimensions along which the three groups of post-secondary students differ are also similar. This latter study gives some information in regard to the usefulness of the scales. In general the study suggests that values, needs, and preferences are important variables and are probably useful in vocational counselling. As to which instrument is the most useful, the results are less helpful.

The classification tables suggests that the LRI-VS shows the highest rate of correct classification and has the lowest shrinkage. The WVI shows the lowest correct classification rate and also the highest shrinkage. This suggests that the LRI-VS does a better job than the WVI in correctly classifying the business students, the education students, and the rehabilitation medicine students. Whether or not this can be generalized to other groups is a matter for research. In general the convergent and divergent validity study and the findings regarding the nature and the relationship of the factors of the scales do not argue for the use of one instrument over the other. The information from the concurrent validity study also does not suggest that one instrument is superior to all others. When the results are comparable as they are in this study then such concerns as the ease of administration, ease of scoring, respondent fatigue, and appropriateness of norm groups may play a greater role in the decision to use a particular instrument. The choice is up to the user, hopefully the choice is now an informed one.

As with most research there are factors which limit the generalizability and the certainty of the results and conclusions. The present research is no different. The selection and composition of the sample in the present study limit the generalizability of the results. The participants in the study were all volunteers and predominantly female. This does not necessarily limit the conclusions in regard to

the high degree of similarity found between the constructs in study 1 or the highly significant relationship between the factor structures found in study 2. It may however, limit the generalizability of the conclusions regarding the substantial nature of these similarities. These limitations notwithstanding the present research does provide a first attempt to present both an operational and empirical integration of the concepts of work related needs, values and preferences. It should, of course be considered a beginning rather than an end. The limitations of this study preclude hasty generalizations about underlying structures in this domain of vocational psychology. Certainly the research needs to be extended over a variety of samples. Sex differences have been shown in this area especially in the area of factor structure (e.g. Hendrix and Super, 1968; Pryor, 1980). Thus the substantive nature of the findings reported here may reflect the large proportion of females in the sample. Certainly the study of the concurrent validity of the instruments with other groupings of students and non-students may provide more insights into the importance of the constructs.

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Appendix 1: Instructions to Students

Dear Student,

Thank you very much for your participation in this survey of work attitudes. The survey consists of five questionnaires, and the following paragraphs will give you some instructions on how to respond to them. Since the answers will be read by the computer it is essential that you use the special computer scorable answer sheets to indicate your responses. Please be sure to use a black lead **PENCIL** (HB or softer) when marking the answers.

Preparation of the answer sheets.

In order to determine which questionnaires belong to you we will be using the **red, five digit number**, which can be found at the bottom right hand corner of the booklet titled "LIFE ROLES INVENTORY". We ask you to copy this number onto the answer sheets and booklet in the following manner:

1. Life Roles Inventory answer booklet: please find the **Special Codes** section on the front page of this booklet. There are six spaces for numbers to be written under SPECIAL CODES. Leave the left most space blank. Copy the red five digit number into the remaining spaces. Each box has a column of circles underneath it. Notice that there is one number inside each circle. Fill in the circle that matches the first number. Repeat the process for each of the numbers. Mark only one circle in each column.
2. The other 3 answer sheets: Again look for the **Special**

Codes section on these 3 answer sheets. As on the booklet, leave the left most space blank and copy the **same red five digit number** into the remaining spaces. Then fill in the matching circles below the numbers. When you are finished, please check again that you have the **same** five digit number written and coded on all four answer sheets. Thank you.

Please complete the front of the Life Roles Inventory by filling in the circles to indicate sex, birthdate, and grade or education. Thank you !

Now you have completely identified all the answer sheets by coding the number on all of them and filling out your name on the Life Roles Inventory. You do not have to fill out your name again on the other answer sheets.

Responding to the questionnaires

You may complete the surveys in any order. It is important, however, that you carefully match the question booklet with the proper answer sheet.

The answers to the Vocational Preference Inventory should be marked in the section of the Life Roles Inventory called **"Special Survey Section"** on pages 11 and 12. Question 1. "criminologist" matches answer space 1, "private investigator" matches answer space 2 and so on to answer 160. Be sure your answer is placed in the correct space.

In the Special Survey Section indicate the occupations which *interest* or appeal to you by filling in answer "A" with your pencil.

Show the occupations you **dislike** or find uninteresting by filling in answer "B" with your pencil.

Make no marks when you are **undecided** about an occupation.

The other three questionnaires should be answered on the answer sheets that have their name printed on them.